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LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

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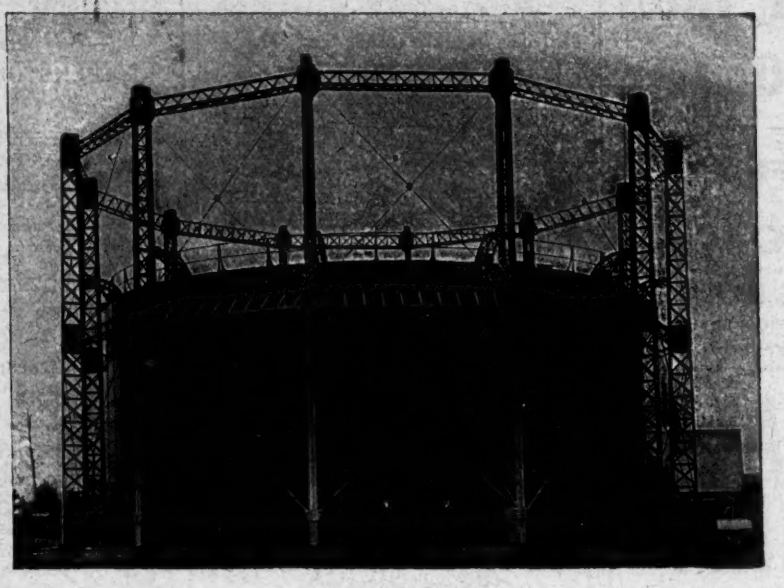

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EDITORIAL NOTES.

On Probation.

THE report of the Departmental Committee on Incombustibles in gas was published, together with a short editorial reference, in the "JOURNAL" last week. Our readers will therefore have had full opportunity for studying the document, which will have given them the greatest satisfaction. It is a well-balanced report, and replete in consecutive and comprehensive considerations, and the findings are conclusive. There is nothing superficial about it; and from the scope of their work, through the evidence, to the conclusion that it is unnecessary "at the present time" to establish restrictions as a safeguard of the interests of the consumers, the Committee have, it is patent, thoroughly examined the pertinent material. We have all recognized that the Gas Regulation Act, transferring charges from volume to actual heat supplied—the consumer only paying for potential heat whatever the amount of incombustibles in the gas—entirely altered the aspect of the question entrusted to the Committee for their adjudication. Had the Act not been in existence, and had charge on volume still been the rule, with the old testing legislation applying (which in some places was carried out in a more or less perfunctory manner, and sometimes not at all), the chances are that the conclusions arrived at would have been of a complexion different from that now before us. As the law is that charges are now to be on the heat-unit basis, the matter, so far as the Committee were concerned, resolved itself into considering whether gas of any specified calorific power was reduced in its value to the consumer by the incombustible constituents it may contain. This was the main point for adjudication; but, had it been answered in the affirmative, it would require to be subdivided into certain equally important considerations to both gas undertakings and consumers. If the efficiency of the gas were found to be affected to a widely varying degree according to the use to which it was put, then it would be necessary to assess the relative importance and extent of the different uses of gas, in order to determine whether in the interests of the consumers *as a whole* (these words require emphasizing) it were necessary or desirable to prescribe any limitation of the proportion of incombustibles. If it was determined that the proportion of incombustibles in gas did, in fact, specially affect a particular use of the commodity, and not other uses to a material extent, then it would be desirable to restrict the prescription of a limitation of the proportion of incombustibles to certain classes of undertakings in whose districts of supply that particular use prevailed to an unusual extent. Reading these penetrations of the position as to what would have been necessary had the Committee decided that the evidence showed that there were uses of gas which were badly affected by incombustibles, the Board of Trade will no doubt be glad to find that, on the soundest of reasoning, their already far-reaching functions in relation to the gas industry need not be rendered more complex by inquiry into the quantitative uses of gas for different purposes in individual supply areas, and then by making pronouncement as to the extent of desirable restriction.

The evidence laid before the Committee in favour of limitation was the product of war-time and irregular conditions, through bad coal and oil supplies, shortness of labour, and (for years) irremediable plant depreciation. The case for restriction was peculiarly weak and invertebrate; but we believe that those who urged restriction were perfectly honest in the statement of their convictions. The fact is the knowledge of the claimants for limitation did not extend deep enough to enable them to detect, and to set in a position of actual relevancy, the causes that produced the effects. This is clearly shown by the report, which bears the impress of analytical expert minds with the task before them of acting justly in the interests of all. The evidence, theoretical, scientific, and research, contradicted that of practical men, and solely because the latter had fixed ideas in one direction, and had not given due weight to the multiform disturbances of gas supply during war time and which have continued since through industrial unrest, financial considerations, high costs, and the inability to do all in a short time that has to be done. The disturbances of the gas supply may have combined to affect the efficiency of furnaces; but, in the opinion of the Committee, the evidence does not establish that the reduction of the percentage of incombustibles *per se* would necessarily have produced the results desired. As to lighting, tests from different parts of the country, with gases containing different proportions of incombustibles, indicated that in many cases any deleterious effects which the admixture of a high proportion of incombustibles might exert upon the efficiency of utilization of the gas are, to a considerable extent—perhaps sometimes wholly—balanced by simultaneous changes in the proportions of combustible constituents due to the latter occurring in the gas used for dilution in a ratio different from that in the original gas. Then it appears clear from the evidence that any harmful effects of the presence of incombustibles in general in gas is usually negligible for gas-engines and for relatively low-temperature operations—such as water boiling—and that in the case of gas-fires the deleterious effect is small even with a high proportion of such constituents. But in all cases the appliances must be adjusted to suit the peculiarities of the gas; and the previous rate of heat-unit supply must be ensured.

All this briefly indicates that the Committee in drawing their conclusions well dissected every part of the evidence. The report, too, shows how fully they appreciate the difficulties the industry has had, and still has, to encounter. They fully realize the impossibility at this transition stage of fairly gauging future developments and effects; and they can find no ground in the evidence to justify any hampering of the gas industry in working for progress, while the Gas Regulation Act fully protects the consumers. They know, too, that reason exists among the technical and commercial men of the industry, and that in future, when the industry is in a settled position again, incombustibles in gas will be largely controlled by economic considerations, and the plant will not be (so far as avoidable) loaded with something for which no charge can be made. But as we pointed out last week, the Committee refuse to tie themselves for all time. They are not certain as to what the future has in store. If it is not established as the result of the inquiry that restriction of combustibles is necessary or desirable "at the "present time" as a safeguard of the widely varying interests of the gas consumers, then we can conceive (having in view the seven years' history of the industry) of no time when it is likely to be. The Committee, however, recommend that a further inquiry be instituted after three years, when the therm basis of charging for gas has become general, and the difficulties of gas undertakings "are likely to have "become mitigated." This is only a recommendation. It does not necessarily follow that there will be another inquiry at the end of three years; but the Committee apparently think there ought to be, to ascertain whether the new conditions and changing technical procedure bring forth any new evidence. They are unpersuaded that there will not be some new evidence. "It appears to us possible that stronger "evidence might perhaps be put forward at a later date in "favour of the limitation of the proportion of incombustible

"constituents in town gas, *or of certain of them*, than has "hitherto been the case." What have the Committee in view? Carbon dioxide! "At present, while the evidence "appears to indicate that for certain uses the harmful effect "of carbon dioxide is very considerably greater than that "of nitrogen, it is nevertheless insufficient to enable us to "determine at what point a limitation of the proportion of "any or all incombustibles becomes necessary or desirable." Looking back in the report, there is found a reference to the presence of air in gas, and then we have this: "With gas "containing up to about 30 p.ct. of other incombustibles, "the consumer is apparently little if at all prejudiced, pro-"vided the calorific value is not below a certain figure—"*e.g.*, 400 B.Th.U. gross per cubic foot, and the content of "carbon dioxide is not excessive—*e.g.*, is less than 8 p.ct. "The evidence before us suggests that such a limitation "would not be onerous to the gas industry at the present "time." The evidence merely "suggests;" but (*vide* the conclusions) it is "insufficient to enable us to determine "at what point a limitation of the proportion of any or all "incombustibles becomes necessary or desirable." Thus the 8 p.ct. is a matter of uncertainty; and while the Committee say the evidence "suggests" this, in another place we read that "it was agreed that a limit of 10 p.ct. of "carbon dioxide would not be onerous to the gas industry "under present conditions of working." So the matter of carbon dioxide manifestly remains open for further consideration, when evidence has accrued from developments and operations on the heat-unit basis.

To all intents and purposes, therefore, the industry is on probation for at any rate a period of three years. Last week we commented on the brevity of this period, in view of the research and constructive work the industry has to do. Obviously, a period of three years is insufficient for a complete development and reorganization of carbonization and gasification practices under all conditions of working and requirement. On the other hand, there will be technical developments in some undertakings in the several processes of gas-making which will offer some guidance as to whether any limitation is desirable, even in the single matter of carbon dioxide. This being so, perhaps there is some justification for not deferring the matter too long, and allowing the industry to progress too far along the road of change before knowing precisely what restrictive condition or conditions may be attached to them. During the three years' probation, it will depend very much upon the character the industry forms whether or not any other inquiry will be necessary, or whether or not restriction in any one incombustible shall be applied. It behoves the industry therefore to keep this contingency well in view. Coal-carbonizing plant, water-gas plant, and complete gasification plant must be worked in a manner, under satisfactory control, that will ensure good results in respect of inerts—particularly carbon dioxide. If, looking at the matter fully in the face and from all angles, there is no present necessity for restriction, then there must not be in three years' time. The technical officers in the industry have a responsibility in this regard. Those who asked for restriction had been secretly watching the doings of gas undertakings in respect of inerts in the years of grave difficulty. The responsible gas officials were unaware of the detective work; and gas was then being sold by volume. We may be sure that, in view of the probability of the question again coming up for review, there will be no cessation of the watching; and that (if it is considered that they have sufficient warrant from what they find) those who ask for restriction will appear at the further inquiry with a case stronger in its technical structure than they had on this occasion. The report gives generous encouragement to the gas industry; but technical care must endeavour to render unnecessary any demand for the reopening of the matter at the expiration of three years.

The Lighting and Heating Season.

RAYS of daylight come through the blinds later in the mornings than two or three weeks since; the blinds are drawn and artificial lights are going earlier in the evening than but a short time ago. There is a cold nip in the air morning and evening—a strange contrast from a few weeks ago. This means the advent of the lighting season; and the morning and evening lowering of the temperature is merely the precursor of the days when at those periods we shall be wanting heat in our rooms, and later on heating throughout the hours we are not asleep. This is the time then for looking into matters affecting trading in both lighting and heating appliances, and in gas for these purposes. Are our manufacturers of lighting and heating appliances well prepared for the approaching winter? And have the responsible officials of gas undertakings looked into their selling organizations to see that there is nothing missing in them or any weakness present, and that in every direction things are up to the best standards? There was never a time when it was more necessary that they should be, not only because appliances and gas cost more than before the war, but for other reasons. Despite its current price, gas stands for heating in a pre-eminent position as a labour-saving fuel. It is necessary that gas undertakings should make the most of the position—now.

The retail price of coal is high; it will not always be so. The advocates of smokeless fuel produced by low-temperature carbonization are very active. But at present the commercial aspect of developments in this direction is very clouded. We are not anticipating this condition will alter; but while research is proceeding, it is prudent not to speak too positively. At the moment, however, it looks as though smokeless fuel so produced cannot be vended at prices per ton so low as coal; and the factors of storage and labour are still disadvantages in these days of changing habits, desires, and types of dwellings. Moreover, in the competition, gas for heating has no stand-by charges, as in the case of solid smokeless fuel or coal fires, which must be kept going to obviate the trouble and expense of relighting when required. Then there is electricity. The stimulators of interest in the electricity supply industry are urging the utilization of the new powers of hiring-out and hire-purchase, and schemes for the purpose are being furthered. The manufacturers of electric appliances are also considering how they can best help in this matter. But with a unit of electricity costing 2½d. to 4½d.—in some cases less, in others more—as a heating agent, electricity is not, in point of economy, in the same street as gas. Electricians know this well; and some even realize that the short and the small use made of electric radiators during the evening load is a positive disadvantage to a station in a residential area. Nevertheless the campaign for electric heating custom is to go on. The current of events is now set definitely towards the bi-part tariff, which is—for the consumers—a beautifully beguiling conception of the electrical mind. There again those who will purchase current by paying a fixed primary high figure, and then a smaller secondary figure per unit of electricity are the few, and not the mass. Besides the high price of electrical heat units, appliances and installation costs are high.

But everything points to the fact that the present season constitutes an exceptional opportunity for gas undertakings to connect-up custom before conditions undergo any change which may lessen the present difference in the competitive terms. We repeat, Are sales organizations being explored to see that all is at a high level of efficiency for the work? Is hiring-out being restored where it has had a lapse, or is hire-purchase being substituted? All the better if both business-getting processes are, or can be, established. Are advertising and other general propaganda in good case? Are showroom windows being made more attractive than ever before? Or have they been left in a condition in which they have lost all attractive influence, and people simply pass by heedlessly through having become as accustomed to the ancient display as they are to the pavement on which they are walking? But above all, are the salesmen well tuned-up to their work—work that is now changed? We have met with men called "gas salesmen" whose ignorance of the appliances they have for sale, of what gas can do, and of its virtues and efficiencies, and of the scientific facts that are the answers to traducers, would lead to their prompt dismissal by some managers, if they did not rapidly change their inefficiency to efficiency. We have met gas salesmen who are the very antitheses of these unproficients. The gas salesman thoroughly educated in his business is nothing short of an imperative necessity to-day. He must now be able to talk in therms and efficiencies, as well as in cubic feet. British thermal units being the basis of efficiencies, the purchased heat-giving agent and the performance of the appliance have been brought into closer relationship than when gas was bought by the 1000 c.ft. The gas salesman has to meet all sorts and conditions of people—some educated in greater or less degree, some illiterate, but all wanting to know something. He must therefore be thoroughly grounded in his work, and must be able to talk intelligently and informatively to the educated and plainly to the illiterate. We

cannot insist too strongly for the salesman on a sound and complete technical education on the commercial side. To-day things, internal and external of the industry, are not what they were; and the gas salesman, with his important place in a gas undertaking's trading system, must be abreast of the times in markets for light, heat, and power agents.

The End of "D.O.R.A."

THE Defence of the Realm Act came to an end last Wednesday night, when officially the war terminated, though actually in the minds of most people it ended nearly three years ago, when hostilities ceased in the field. While the Act has served large and beneficent national purposes, there will be great satisfaction over the close of control. The country has had more than enough of it. It has not done anything to cultivate our affections, however necessary it may have been; and it has increased the dislike (more or less deserved) of bureaucracy. So there is no mourning over the demise of "D.O.R.A." She has had associates, some of which have survived her. Among these are the Summer Time Act, which has another year to run. The Statutory Undertakings (Temporary Increase of Charges) Act has a life of two years from the official ending of the war. So far as the gas industry is concerned, there is no further use for this measure, for the Gas Regulation Act now exists. All statutory gas undertakings can get price revision, in accordance with the new economic conditions, under section 1 of this Act, and non-statutory gas concerns can equally well proceed under section 10. The Public Utility Companies (Capital Issues) Act continues in force for five years from 1920, but no longer unless Parliament otherwise ordains. When the Act does expire, the event will not affect anything done under it. But the gas industry has no particular use for it to-day, seeing that the powers granted under it can be secured through the Board of Trade, and section 10 of the industry's own Regulation Act. The official "ending" of the war," too, will affect the operation of not a few contracts; and some fortunate members of the legal profession will find interesting and perhaps lucrative employment in making necessary readjustments in these instruments and other trading agreements.

The Miners' Chagrin.

COAL consumers and the country generally are the heaviest sufferers from the policy and folly pursued by the Miners' Federation dominated by hotheads and revolutionaries, and which culminated in the thirteen weeks' coal strike, the effects of which were bravely borne by the whole of that major part of the nation not immediately involved in it. Now that the strike has ended, many of the miners feel aggrieved over what has happened, though they have no room for thought as to anybody's grievances but their own. However, they have abundant reason for resentment. They know now that they were grossly misled and fooled. They are aware to-day that the strike was for something that was illegitimate and political in its nature. They know, too, that the misleading is attributable not only to those who were out for something beyond the pale of practical politics, but to those leaders who saw the wrong, and who maintained silence when everything pleaded with them (other than "loyalty" to the numerically powerful wrong-doers) to open their mouths, and proclaim the truth. The miners know what they have lost. Impoverished themselves, their unions are in the same position, and in a mass of debt, from which they are trying to extricate themselves by levying heavier subscriptions upon the members, thousands of whom are only employed now two, three, or four days a week, with thousands more swelling the army of the country's unemployed—unemployed largely through the actions of their own equals and trade unions. The miners are very fortunate who have full work. They know, too, that the policy of the Miners' Federation and their local leaders have done more to bring about the present conditions of employment in their own industry and many others than anything else. The miners may not openly acknowledge all these things; but they are matters of common cognizance among those in immediate contact with the men. Actions, too, sometimes speak louder than words.

The South Wales miners are in open revolt with their local Federation. At the Leamington Conference last year, a resolution was passed requiring all the district Unions to charge their members a uniform contribution of 1s. a week. During the protracted strike, the South Wales Federation were not in a financial position to pay members the prescribed strike benefit; and now the men are refusing to pay the prescribed 1s. per week levy. The enginemen have also seceded from the Federation—not being easy in their minds over the enforced withdrawal of their services during the strike; and other trade unions are offering them and other mine workers more attractive benefits for smaller contributions. The Executive of the South Wales Federation, in their umbrage, describe these as "parasitic" and "mongrel" organizations. The position of the local Federation is not a happy one. This, and the extent and depth of the revolt, are shown by the resolution the Executive have passed reducing the contributions of the members by one-half, with benefits, conditions, and practices of the order that existed prior to August, 1920. The acts of the Executive, like those of the men, speak louder than words. But with all the difficulty with which they are faced, the Executive cannot avoid misrepresentation. In a manifesto they have issued, they attribute the strike to the action of the colliery owners in trying to enforce an unjustifiable reduction of wages last March. They say nothing about the national pool, nor about the withdrawal of enginemen, which not only wrecked and flooded mines, but destroyed public sympathy and the employment of many of their own members. They should refresh their short memories by re-reading the address of Mr. Herbert Smith at the recent annual conference of the Central Federation. If the miners did the right thing, they would throw out of office neck and crop the men who so deplorably misled them, and brought them to the present bitter crisis, through which it is evident there will be slow travelling. In their place, men are wanted who have the foresight to assess intelligently the effects of any policy that may be adopted. It is evident the Executive of the South Wales Federation have had a nasty fright, and their appeal to the men for continued solidarity is the call of men who know they have forfeited the confidence of their followers.

Gas-Workers' Wages.

Under the agreement signed on June 28, the second half of the wages reduction then fixed will take place next week. The agreement provided that the wages were to be lowered by the amount of the advance made in June, 1920; and this was to be done in two equal instalments. The advance in price last year was 1s. per day or shift, which carried with it the 12½ p.ct. bonus. This means 6s. 9d. per week, half of which was taken off on July 15, and the other half is to come off on Sept. 16. In several industries further adjustments of wages are due in September under agreements between employers' organizations and trade unions. Officially, it is intimated that 2¾ million workers are covered by these arrangements, and fifty-five industries.

Slackness in Gas-Coal Buying.

Some of the important coalfields have nothing to report as to gas-coal buying during the past week; but from other quarters we learn that in none of the fields is the pressure great for the sorts used by gas undertakings. It is reckoned by not a few colliery people that force of circumstances—atmospherical and industrial—will shortly alter the situation to their advantage; but this is not particularly obvious with the considerable stocks of coal available at the collieries and the short-time working and number of unemployed in the coalfields generally. The lull in the demand for supplies of gas coal is due to the restored feeling of safety; and with the glut of coal in existence, there is no difficulty in buying as required, and from quarters whence the best offers come. There are many responsible gas officials to-day who are thinking it is a good thing not to be tied in the matter of coal, and to be free to make their purchases through any channel from which offers come. Generally speaking, the view is that difficulty in securing supplies is now a remote contingency, other than possibly during bad weather in the coming winter, and so long-term contracts are unfashionable in the gas industry at the moment.

Export Coal Trade.

The export coal trade is being recovered—but slowly. The policy of buyers abroad is a waiting one; but they are nibbling and buying through the lower charges now being made. All that could be done is not being done owing to the still high cost of production, partly due to miners' wages, the smaller volume of

trade, and therefore the smaller production. But it is stated that a stage has now been reached when Welsh coal can compete with American on the Continent, and so the American export trade is declining. High railway rates and high prices of pit furnishings are also charged with restriction in the coal trade. America's production of coal from Jan. 1 to July 31, 1920, was 302,663,000 tons; in the same period of 1913, it was 264,506,000 tons. Despite the large export trade this year, it was only, in the same seven months, 226,686,000 tons—this being due to the industrial trade depression in the States. America has something for which to be thankful, in that the requirements of other countries helped to keep her coal pits busier the last three or four months than would otherwise have been the case.

Employment and Coal Output.

Official figures have now been published which show that during the four weeks ending with July 30, 15,223,500 tons of coal were raised in the United Kingdom, and that the number of workers was 1,043,400. Of course, some were working on short time, so that not much value can be attached to any test to ascertain their output. The production, however, only averaged 14·6 tons per person for the four weeks, which, multiplied by thirteen, only represents 189·8 tons a year. This would be very bad if it could be taken as a figure for application to normal circumstances. Anyway, the miners at work will have to put their backs into the business better than they are now doing if they want the coal industry to make quick recovery. We learn that another of the Staveley Company's pits has been closed-down—making the third since the termination of the stoppage. The Chairman of the Company (Mr. Charles Markham) says colliers' wages must come down still more before trade can improve. Mr. Markham is also connected with the Parkgate Coal and Iron Company; and he states that they are now buying Belgian iron delivered at the works at £5 2s. 6d. per ton, because their own costs of production run out to £6 15s. The wages of blast-furnace men went up 280 p.ct. in the war, and have only come down by 120 p.ct. The management has offered to restart one furnace at a flat decrease of 2s. 6d. per day for shift men, which would make their daily wages 14s. 11d. Under the sliding-scale, the wages will fall to 14s. 1d. in October; but the men prefer in the meantime to remain idle, and draw unemployment pay. This is a case in which there ought to be power to refuse unemployment pay, if work on such good terms is rejected.

Smokeless Fuels and a Chimney Tax.

As was recently seen when at the Fuel Research Station, Sir George Beilby, the Director of Fuel Research, and his technical staff are busy exploring (among other things) the possibilities of low-temperature carbonization, and in attempting to ascertain whether they can develop an automatic system, which will dispense with a large amount of the labour that would be ordinarily required, and reduce the costs of production. This is a matter of considerable importance; and, if successful, the owners of existing processes that claim much but do little will regretfully have to scrap the products of their labour. It is upon the net cost of production that ultimate commercial success must rely. The recent article by Sir Napier Shaw, F.R.S., on smokeless fuels [*ante*, p. 480], has induced "The Times" to seek some information from Sir George, who thinks this a highly favourable time for educating the public on the subject of smoke prevention; but we rather think the public will be wanting to search for the man who in these days of heavy taxation has suggested that a chimney tax might be so applied as to stimulate and encourage the widest and most radical improvement in domestic heating. There seems to be an almost illimitable prospect before the gas industry when Sir George tells the public, through our morning contemporary, that there are 140 million tons of coal used in this country, of which 35 millions is burned for domestic purposes. The problem is to what extent is it practicable to replace the huge quantity of 140 million tons by gas, oil, and coke by coal carbonization at high temperature or low temperature, which latter means between 500° to 600° C. It is believed by Sir George that the gas industry will get a large amount of new business in heating by the new incentive it has to produce gaseous heat units on the most economical basis, which is a matter in which the public should take a lively and facilitating interest. At the same time, he thinks, if a smokeless solid fuel could be produced, at a cost permitting it to be sold at little more than the price of coal, it would lead to a complete revolution in domestic heating, and would open-up a new branch for invention in stoves and other appliances for its use.

The Uncertainties.

This has been the attractive prospect spread before us by enthusiastic inventors and company promoters over many years; yet its realization seems always to move a little further into the future. Sir George is convinced that only by low operating costs and a very moderate margin of profit will low-temperature carbonization ever be established on a commercial basis. And it will always be exposed to grave uncertainties. From one year to another, it would be difficult to predict what would happen commercially, as the net cost of production and the selling prices of the primary product would depend, not only on the competitive commodities, but upon the values of the secondary products, which would fluctuate with the values of certain imported products. To illustrate the market uncertainty, Sir George assumes that 15 gallons of fuel oil suitable for naval use can be obtained from a ton of coal. Eight months ago the value of this oil could safely be taken at 1s. per gallon; and the 15 gallons would have realized 15s. To-day the price of this oil is only 4d. per gallon; and the product would, therefore, only realize 5s.—a drop of 10s. per ton of coal carbonized. Low-temperature carbonization is where it always has been—in the speculative region.

Coke Fuel for Water Heating.

To get the highest efficiency from the use of coke as fuel in water heating, it is necessary that it shall be used systematically, and not in any haphazard way. This is the message of a lecture (noticed elsewhere in this issue) delivered by Mr. K. Lidberg, of Stockholm. It recounts the results of some tests carried out on a specially erected water-heating plant at the Stockholm Gas-Works—the plant being so arranged that a good latitude of operation was available in all directions, and careful test-observations could be made. In the amount of useful heat realized, there does not appear to be much difference, under proper regulation, from coke made in Glover-West vertical retorts, hand-charged horizontal retorts, and chamber retorts (all using the same coal), nor does there seem much difference between coke properly dry or wet quenched. At the same time, a high-density coke, with freedom from breeze and small, and a low content of ash and water, has a pull in the matter of advantage. But the figures in the tables show that the useful heat falls in correspondence with the size of the coke. The design of boilers also affects the question of losses. Therefore there should be grading of the coke according to the water heaters or boilers in use; and it has been found that a series of four sizes is sufficient for the current supply of the boilers in Stockholm. The data indicate plainly that there is a rapid increase of carbon monoxide, and therefore loss of heat, as the size of the coke decreases. This loss is almost independent of the rate of combustion, while the reverse is the case as regards temperature losses—these being independent of the size of the coke, but increase with the rate of combustion. Air regulation with the different sizes of coke is very important; but it is emphasized that efficiency is not related to the temperature of the spent gases or excess of air, but that both these factors require an equal degree of consideration in selecting the most suitable size of coke for a given boiler. Size of coke is the important thing. A study of the data resulting from the tests will convey much more than we can present in this reference to the investigation.

Midland Association of Gas Engineers and Managers.—As already announced, the deferred spring general meeting of this Association will be held at Cheltenham, on the invitation of the President (Mr. James Paterson, M.A.), on Thursday of next week, Sept. 15. Members will assemble at the gas-works, in Gloucester Road, where they will be received by the President, and will inspect the works under the guidance of Mr. Paterson and his assistants. Luncheon in the board-room at the works will be followed by a business meeting and further inspection of the works if desired. Afterwards the visitors will have an opportunity of hearing the outdoor military band at the Winter Gardens Promenade; and tea with the President and Mrs. Paterson will bring to a close what promises to be a very pleasant day.

PERSONAL.

The marriage took place on Aug. 31, at the Parish Church, Satley, co. Durham, of Mr. FREDERICK J. BYWATER, M.C. (late Major R.E.), son of the late Mr. J. Bywater and Mrs. Bywater, of Union Lodge, West Bromwich, to Miss Hilda E. Penman, youngest daughter of Mr. and Mrs. L. T. Penman, of Broadwood Park, Lanchester, co. Durham. Mr. Penman has for many years been a Director of the Newcastle-upon-Tyne and Gateshead Gas Company.

A presentation has been made to Mr. ALEX. YOUNG, Managing-Director of Messrs. R. Laidlaw & Son (Edinburgh) Ltd., at the works in Simon Square. The occasion was to mark the fiftieth year of his connection with the business. In the presence of a large gathering of the staff, foremen, and workmen, Mr. Ackford handed over a handsome writing-desk for Mr. Young, and a pendant for Mrs. Young. Colonel David Laidlaw traced the history of the firm, and referred to the numerous advances made in engineering during its existence. The present times, he added, were unusually difficult; but he trusted there would soon be a revival of trade. Mr. Young, in thanking those present for the gifts, alluded to the changes which had come to pass in engineering during his connection with the firm.

The completion of fifty years' service with the undertaking was marked by a handsome presentation to Mr. CHARLES H. NETTLETON, the well-known President of the Derby (Conn.) Gas and Electric Company, and one of the most prominent business men of the town. Mr. Nettleton entered on Aug. 1, 1871, the service of the Company of whom he has for many years been the head; and to commemorate his jubilee in this connection, Directors and officers of the Company gave a dinner in his honour, and presented him with a handsome silver, gold-lined loving-cup, of exquisite design, and suitably inscribed. The employees, also, presented him with an easy chair and a mahogany clock Mr. Nettleton entered the service of the Company immediately following his graduation from the College of the City of New York, filling one position after another, until in 1900 he took the Presidential Chair. His father was one of the founders and the first President of the Company. In addition to being at the head of the Derby Gas Company, Mr. Nettleton is President of the New Haven Gas Company.

OBITUARY.

THOMAS STEPHEN LACEY.

A wide circle of friends in the gas industry and outside it will share our feelings of regret at the news of the sudden death—it occurred at Highgate on the 2nd inst., after only two days' illness—of Mr. Thomas Stephen Lacey, who retired only three years ago, after 42 years' service with the Gas Light and Coke Company. In that long period, he did much good work, and won for himself high esteem; and very many instances can be recalled of his readiness to share with others the benefits of his wide experience. Perhaps the last occasion on which he gave his views at a technical gathering was in the discussion of the gas papers read two months ago at the Engineering Conference of the Institution of Civil Engineers. He was particularly conversant with the chemical aspect of the gas industry, and closely connected with the development of gas testing and analysis.

Born in London in 1857, Mr. Lacey was educated at King's College School, and was articled in 1876 to the late Mr. G. C. Trewby, then Engineer of the Beckton works of the Gas Light and Coke Company. On completing his articles, he acted as Assistant Engineer at the works until 1891. Subsequent to this he was successively Resident Engineer of the Company's stations at Pimlico, St. Pancras, Bromley, and Nine Elms—returning to Beckton in that capacity in 1913. Thus the whole of his active life was spent with the Gas Light and Coke Company.

At their meeting on April 12, 1918, the Directors of the Company, in accepting with great regret the resignation by Mr. Lacey of his appointment as Resident Engineer of the Beckton works, placed on record their appreciation of this extended and loyal service. Mr. W. B. Leech, who succeeded him, took up his duties on July 1 of that year. Before leaving, Mr. Lacey was presented by the staff with a recording barometer; and later, at a meeting at Beckton, presided over by Mr. Leech, there was presented to him a silver tea service subscribed for by the workmen. Reference was made then to the good feeling that had always existed between the men and Mr. Lacey during the long period of his connection with the Company. This happy function was followed by the gift of a sideboard, as a memento of the personal regard of the engineers and other officers of the Company; Mr. Thomas Goulden, the Chief Engineer, who occupied the chair, remarking that the present would remind Mr. Lacey of his numerous friends yet in active employment.

In 1883 Mr. Lacey was elected an associate member of the Institution of Civil Engineers; being transferred to the class of members in 1915. He was also a member of the Institution of Gas Engineers, and of the Eastern Counties Gas Managers' Association.

His loss is mourned by his widow, daughter, and five surviving sons, two of whom are Engineers with the Gas Light and Coke Company. It may be mentioned that both his father and father-in-law (Mr. John Johnson) were also in the service of the Company. The funeral took place yesterday at Highgate Cemetery.

Mr. R. H. AINSWORTH, the Secretary and Manager of the Solihull Gas Company, passed away on the 22nd ult., the immediate cause of death being pneumonia. His health had been very precarious since last March; and he was granted leave of absence for two months, but unhappily derived no benefit thereby. At the funeral, the Midland Association of Gas Engineers and Managers were represented by Mr. F. J. Ward, of Knowle; a wreath being sent by the Association. Mr. Ainsworth, who was 43 years of age, went to Solihull nineteen years ago from Stockton, where he had been one of Mr. W. Ford's pupils and assistants. During his management of the Solihull works, the sale of gas trebled. He was appointed Secretary about eighteen months ago. His nature was genial; and he was greatly respected by his Directors and by the inhabitants of the district. There are left a widow and four children (two of them very young), for whom great sympathy is being manifested.

ELECTRICITY SUPPLY MEMORANDA.

THE coal strike has been responsible for arousing a great deal of interest in professional electrical circles as to the cost of fuel for steam-raising. Oil has secured many partial adherents; and even though the cost of oil may be somewhat more than coal, considering only the fuel item, many there are who intend for the collateral advantages to maintain the "second string to their bow." The higher evaporative duty, the cleaner application, and the reduction of labour cost (including the part occasioned by the disposal of ashes) have also to be taken into account, in addition to the bare cost of fuel. Attention has been drawn rather prominently to some tests that Mr. Hamilton, the General Manager of the Leeds Tramways Department, has been making into the relative costs of oil and coal; but, unfortunately for a fair comparison being made, he has only taken into account the respective fuel costs, which is not quite just to oil. We have not seen the full report, so that the summaries in the technical papers may be incomplete. But from these it is seen that the tests lasted six hours. The oil fuel was used on eight boilers, seven of which are fitted with the "Gretna" type of burner (two on each boiler), and one with the "Johnson" type (four burners). Ten tons of oil were consumed; and 11,300 units of electricity were generated—giving a consumption of 1·98 lbs. of oil at a cost of 1·115d. per unit, against a coal consumption of 2·859 lbs., at 0·56d. per unit, taking last year's prices. Oil was priced at £5 5s. per ton. Mr. Hamilton concludes that oil would have to be £2 17s. per ton to compete with good coal at £1 16s. per ton, or £2 19s. per ton to compete with coal at £1 17s. 6d. per ton. Taking his figures, we calculate that the electrical efficiency, at 18,000 B.Th.U. per lb. of oil, is only 9·6 p.ct., as compared with 8·7 p.ct. with coal at 13,000 B.Th.U. per lb. The thermal values per pound are hypothetical. Of course, the efficiency of the oil has relation to the manner in which it is used. Atomization by pumping under pressure through specially designed burners, from which it issues with a whirling motion at high velocity, is preferable to atomizing or spraying under the steam or air jet system. But the installation cost, with the pumping set, special furnace front, &c., is higher. While steam spraying is effective, it is apt to be somewhat wasteful, through a percentage of the oil escaping combustion. Compressed air is not extensively used for boiler work; and it is more suitable for metallurgical furnaces. The steam or air atomizers are more successful with the lighter fuel oils than with heavy oils; but the pressure system will deal successfully with either light or heavy oils. However, Mr. Hamilton is doing excellent work if his average consumption of coal per unit is only 2·859 lbs. Naturally, it is upon cost that the class of fuel used must depend; but it should be the over-all cost entailed by the fuel. Taking the fuel cost view, coke should have a larger adoption than ever.

Oil or Coal for Steam-Raising.

Oil Fuel Dangers.

The use of oil for boiler-firing introduces fresh working conditions, in which there are dangers. There are risks, too, associated with the return from oil to coal firing. The Manchester Steam Users' Association have dealt with these matters in a pamphlet which has been circulated among members, and which is highly interesting. Attention, for example, is directed to the fact that unconsumed or partially consumed oil may have settled in the flues, or oil leakages may have saturated the brickwork. If, therefore, the dampers should be closed overnight, as is customary under coal-firing conditions, vapours may have accumulated in the flues, and would explode on lighting-up. There is also the danger that fine carbonized particles of oil which may have settled in the flues might be disturbed when coal is burnt; and in this case, too, explosions might occur. It is, therefore, desirable to continue the precautions against oil dangers for at least a week after returning to coal firing. Flue gas explosions are more common with oil fuel than with coal, especially with the steam or air jets. A mixture of atomized oil and air is explosive; and

it is important the oil should be burned as soon as sprayed or atomized. In the event of a flame failing and the oil continuing to flow unburnt, there would soon be a considerable volume of explosive gas in the flue, that would explode on reaching ignition temperature. It is suggested, therefore, that two burners in one furnace are preferable to one large one—the likelihood of both failing together is much less than that of a single one failing. There are other causes of flue-gas explosions. For instance, unburnt oil in the flues where it will vaporize (perhaps while the boiler is at rest during the night) to explode when the boiler re-starts work. To avoid these risks, the flame should be kept under constant observation; and the dampers opened wide sufficiently long before lighting-up to ensure that the flues will be clear of gas. Should it be found that a flame has failed, and oil vapour is passing unburnt into the flues, the oil should be shut-off until the flues are clear, before re-lighting. Any oil leakage is, of course, objectionable, and may be dangerous. In one case, oil found its way into the boiler side flue from a leaky tank, resulting in a gas explosion which caused serious damage. The sudden cooling of boilers or brickwork should be avoided—in particular, silica firebrick, which resists high temperatures, is apt to crack if cooled suddenly. Hence when shutting-down a boiler having silica brickwork, it is necessary to keep the air-admission openings closed, and allow the brickwork to cool gradually.

Internal Combustion Engine Supremacy.

A strong enemy of the use of oil fuel under boilers is Mr. S. H. Fowles, who is an authority on fuel and boiler efficiencies. He asserts in an article in "Gas and Oil Power" that the use of coal and oil under boilers is wasteful for electrical generation, and presents the case for a greater use of the internal combustion engine. Valuable oil fuel he maintains is being consumed under boilers to provide power and light at a consumption well over nine times in excess of what it should be This is a startling statement; and it means that, if the oil instead of being used under boilers was consumed in internal combustion engines, less would be required to be transported, purchased, handled, and everything else in proportion to the electrical energy generated. Therefore, had there been sufficient internal combustion engines available for oil use during the coal strike, there would have been less stoppage of work, for the oil at command would have gone farther, and the industries using electrical energy would all have fared better. The position to-day is, says Mr. Fowles, that many people are converting their coal-fired boilers for oil-burning at tremendous expense in fuel simply to carry a portion of their load. The result is the charge for current has to be raised. Of course, that is not the whole story. The conversion is being made because the steam-boilers and engines are there, and the internal combustion engines for oil use are not. Possibly many would, if it was a question of new plant, prefer gas-engines to oil-engines. Mr. Fowles is as confident as a good many more that, unless fuel costs can be cut, we cannot hope to compete in the world's markets. Consideration of the various factors in the position lead him to the opinion that we are moving steadily to the days when the internal combustion engine will hold sway. Instead of the boiler, there will be the gas producer or a supply of gas from the town's mains, or oil-tanks and the direct use of oil in Diesel or other oil-engines. Electricity works and factories offer a good field for this class of prime movers. There are no stand-by losses; and the engines are readily started-up. They are very useful for taking the peaks of heavy loads.

A Comparison.

Mr. Fowles makes another statement which arrests our attention. He says: "When coal was obtained at 14s. per ton and oil at £2 per ton, it can be safely stated that 1 ton of oil was equal to 10 tons of coal—that is, assuming the oil is used in a Diesel engine." He supplies in the article some striking efficiency curves, which show that at half-load the oil used per KW. generated, in a station completely driven by Diesel engines, equalled 0·713 lb.; at three-quarter load, 0·648 lb.; and at full load, 0·620 lb. This means nearly a straight line compared with a steam-driven station. The oil cost during the period was 73s. per ton. The total costs per unit—including fuel (0·44d.), wages, repairs, stores, management, and rates and taxes—were 0·759d. If the oil had been 40s. per ton, instead of 73s., the total works cost would have been 0·559d. per unit. On a steam-driven station, with coal at 14s. per ton, the total cost would have been (including the same items) 2·2d. per unit.

Power Contracts and Coal Prices.

Talking of fuels and power users, a subject again arises to which we have frequently adverted—that is, the danger of making power contracts with a sliding-scale on coal prices alone. Some electricity stations with such contracts are now feeling the burden of them. Coal prices are descending; and power consumers enjoying such contracts will now be, and are, making demands for the sliding-scale clause to come into operation. But the item of fuel really forms a small proportion of the total costs of a central station. Everything has gone up in price; and though prices for materials and labour are descending, they are not going to slip-down to pre-war levels. Besides this, a large amount of extension, repair, and renewal work has been done at top prices, largely in some industrial areas for the benefit of the power users, whose aggregate demands upon the station are oftentimes now greatly in excess of those of all the domestic consumers. Therefore, where the sliding-scale on coal alone comes into operation, it will mean that there may be a loss on the business with the industrial consumers, and any loss will perforce fall upon the domestic consumers, or the ratepayers. We referred last week to the fact that industrial consumers in times of strikes and slumps in trade are not an unmixed blessing to the domestic consumers, seeing that capital and other charges for all that has been provided for the industrial users continue to run on day by day during the periods when the demands are *nil*, or are on a much reduced scale.

The Opportunity of Autumn.

Holidays are approaching their end, the labour position is in better condition, and autumn is close upon us. An article appears in the "Electrical Times" which reminds of obvious duties in the sales department with the coming of autumn. Though obvious, the reminder is useful; because it is often the obvious that is put-off from day to day, and is neglected. The autumn, the writer says, should be a season of commercial activity; and it would be wise for each responsible electrical official to go through his organization to see that it is all it should be, and to make the best of his opportunities. This applies to gas officials as well as to electrical. The writer thinks that, with returning confidence, business should be much better all round. For many months buying has been at the minimum, and stocks are very low. Of course, financial considerations and high prices have had much to do with this condition. However, with the colder and darker days and nights approaching, lighting and heating will be necessary. There is good business to be done in these lines, "when the article is sufficiently attractive, and the salesmanship is keyed-up to concert pitch." For heating, it is not only the article that must be sufficiently attractive, but the cost of the heat units. In the price of the heating appliance, and of the heat units, the gas industry has a good pull over the electricity industry; and it will be the fault of each gas undertaking if it does not make the most of this. The writer asks the electrical manufacturer whether he is doing all that can be done to offer goods at the lowest economic price, and in the most efficient form. He calls attention to advertising, to demonstrations, to exhibitions, and to literature for distribution. Showrooms and shop windows require overhauling, and periodically changing, so that people in the street do not pass-by without being attracted through an everlasting sameness. There are the sales assistants. Are they educated up to the times? There is particular reason for attention to this matter in the gas industry in view of the change in the basis of charge.

"Electrician" Tables for 1921.

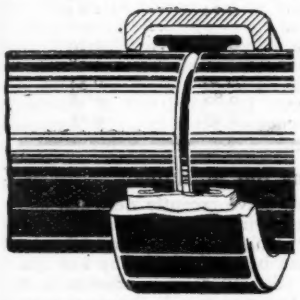
"The Electrician Tables of Electricity Undertakings" for 1921 have been issued by Messrs. Benn Bros.; and the volume is cheap at 10s., *plus* 9d. for postage. The information contained in it is far-reaching, useful, and interesting—not only to those engaged in electricity supply, but to those who are competing with it in various branches of domestic and industrial service. The contents of the book cover British electricity supply undertakings, electricity supply schemes projected, Provisional Orders undeveloped, electric power companies, foreign electricity supply works, and much else. The statistical information on this occasion is presented in a new form; and it is handier and plainer than the old tabulated style. All that one wants to know within the range of the information can be obtained quickly. That the volume is up to date is shown by the inclusion of particulars as to the adoption of oil fuel. Running through the lighting price figures, it is noticed that the charges mostly vary between 6d. and 1s. per unit where flat-rates are the vogue. As to cooking and heating, the prices are anywhere between 1½d. and 4½d. per unit; and casually examining the pages of the book, the eye lights on a figure of 5½d. Such prices make heating by electricity frightfully expensive. Few purses could stand paying anything like such charges. In connection with heating, too, we get such complications as this on the bi-part charge system: Rateable value, 10 p.ct. + ¾d. per unit + 80 p.ct. In another case there is: Rateable value, 20 p.ct. + ¾d. per unit + 90 p.ct. The ordinary consumer would have some difficulty in estimating the probable weight of his heating account in such circumstances. We see war percentage additions to prices are still very prevalent. It is a pity they are not now consolidated, seeing that the chances are very small in many undertakings of being able within reasonable time to clear-off the percentages and return to pre-war charges. In the Metropolitan area, 2½d. and 3d. per unit are quite common charges for heating and power. Power figures in different parts of the country run from about 1½d. to 3d., 4d., and 4½d. per unit; and we see one concern puts forward the tempting bait of 9d. per unit—for power! However, these prices just evidence some of the useful information contained in the tables.

Eastern Counties Gas Managers' Association.—Two papers have been promised for the forthcoming meeting of the Association, which is to take place on Wednesday, the 21st inst., in the Abercorn Rooms, Bishopsgate, E.C. Mr. J. B. Hansford, of edford, will submit a paper on his process for the manufacture of neutral sulphate of ammonia; and in the other Mr. W. H. Warren, of Beckton, will give particulars of a new system of ascension-pipes.

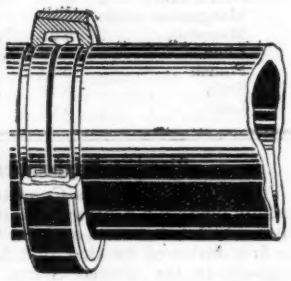
"VICTAULIC" LEAK-PROOF JOINTS.

VISITORS to the Shipping, Engineering, and Machinery Exhibition, which opens to-day at Olympia, will have an opportunity of inspecting in its various types a joint applicable to all pipe-line systems, which, possessing the great advantages of flexibility, allows for expansion, is connected without unions or pack-nuts, may be fixed without the aid of skilled labour, and can be assembled and dismantled with great ease and rapidity. With so many points in its favour, such a joint must—particularly under modern conditions of distribution—make a special appeal to gas engineers; and it is therefore not surprising to learn that already quite a number of gas companies have it under test. To the overcoming of the drawbacks attaching to lack of flexibility in pipe-line systems, the Victory Pipe-Joint Company, Ltd., of No. 28, Victoria Street, S.W., have been recently devoting a great deal of attention; and their "Victaulic" pipe-joints are submitted as constituting a real advance over the old system of lead-caulked joints. Indeed, the inventors (Dr. H. S. Hele-Shaw, F.R.S., and Mr. E. Tribe) regard them as constituting an absolute revolution—brought about by them through realization, during a time of stress, of the need for some such device.

The new joint—the simplicity of which is not the least of its attributes—is naturally made in several forms to suit diverse conditions; but in each case the principle embodied is identical. It is, in fact, a development of the familiar "U" washer, without its attendant shortcomings. Practical tests in varied branches of industry have resulted satisfactorily; but here we must content ourselves with regarding the matter from the gas-works point of view—and, incidentally, it is in its simplest form that the joint will appeal directly to gas engineers. This simplest type of "Victaulic" joint consists of a flexible leak-proof ring, having two in-turned conical lips, which tightly grip the two adjacent pipe-ends. The in-turned lips are of smaller diameter than the



A Perspective View Showing a "Floating Type A" Joint in Position on the Pipes. The Joint is Shown Partly Sectioned and Partly Broken, in Order to make Clear its Construction.



The "Location Type B," which Positively Prevents Separation of the Pipes. The Joint also Permits Flexibility and Expansion. It is used for High Pressures and where a Surface Line is Entirely Unanchored.

ends of the pipes for which the joints are intended. Thus they exercise an initial grip on the pipes as they are placed in position. As the pressure rises, this grip automatically increases, and the initial tension quickly changes over to compression. It is impossible, therefore, for increase in pressure to cause rupture to occur. Thus the development of the "Victaulic" leak-proof ring has produced a flexible and elastic jointing element which is balanced against pressure, is self-sealing, and introduces only the very lightest of initial stresses. In its simplest form, it uses the pipe just as it is cut off, without any machining. Special types developed from the simpler form retain the utmost simplicity. A shallow groove or small shoulder is the most that is called for on the pipe itself. To complete the joint, the leak-proof ring just described is held in position by an outer metal shell, also of shallow "U" section, the turned-over edges of which are just clear of the outside pipe diameter. It will be realized that the joint involves no screwing, caulking, flanging, or bolting; the unprepared plain ends of the pipes being merely pushed into the joint, and that is all.

From what has been said, it will be seen that the strength of the joint is determined by that of the outer shell and the pipe itself. A further obvious point in connection with the joint is the angular flexibility (slight, but sufficient) permitted by its design; the pipe-ends, as previously pointed out, being only in contact with the flexible ring, with clearance provided between them and the metal shell. It is, of course, this flexibility which will spell the difference between success and failure. In a temporary pipe-line, such flexibility will permit the system to follow the contour of the land or obstructions without levelling-up the pipes; and under permanent conditions the protection afforded against vibration, soil subsidence, expansion, &c., should reduce the cost of upkeep to a minimum. Tests carried out by several gas companies have, it is stated, proved that, while being leak-proof at zero, pressure, or vacuum, each "Victaulic" joint is an expansion joint, flexible to about 5° in any direction. The gain already mentioned on the score of cost of maintenance is accompanied by reduced first cost, both in connection, we are informed, with the actual price of the joints and because of the advantages in fixing, &c., mentioned in the opening paragraph. The ease with which a joint may be broken for inspection, alteration, &c., and afterwards re-made, should also not be overlooked.

The form of the joint dealt with in this article—*i.e.*, the "A" or floating type—is capable of carrying medium pressures if the pipes are anchored against longitudinal displacement at the end of the straight lengths, or laterally located at the bends. Where heavy pressures are to be carried, the "B" or "location type" is used, in which the housing engages freely with grooves cut in the pipe end, and does away with the need for anchoring. Either type can be dismantled in an average of less than two minutes per joint and refixed in the same time. These types are the two principal forms. There are other variants; but the chief difference is the securing of the pipes against end displacement.

Literature has been prepared by the Company, in which are tabulated the leading dimensions and working pressures for a wide range of "Victaulic" joints, varying from the smallest sizes to over 6 ft. in diameter. For use on pipes which convey benzole, steam, oil, petrol, chemicals, or corrosive gases different grades of "Victaulite" are employed. The material has been developed by the Company in collaboration with specialists; and its lasting qualities, under the most exacting conditions, are said to have been conclusively proved. Joints have been supplied to resist milk of lime, ammonia gas, hydrogen sulphide, cyanides, hydrocyanic acid gas, sulphuric compounds, and various chemicals and impurities—in some cases alternating from one reagent to another.

SWISS SOCIETY OF THE GAS AND WATER INDUSTRY.

Report of the Technical Inspectorate.

The Ninth Annual Report of the Technical Inspectorate of the Swiss Society of the Gas and Water Industry was presented in July. A copy has come to hand recently; and certain of the information therein will be of interest to gas engineers in this country.

The year 1920-21 was marked by the fact that gas-works were able to approach more normal working; gradually abandoning their war-time practices, such as the distillation of wood, peat, and coal of inferior grade. The Inspectorate has 99 works within its province—one less than during the previous period, owing to the Olten undertaking having shut-down. Of these, only eight are not subscribers to the Society. In all, 84 inspections have been carried out. In the previous term, five works were reported as still employing acetylene plant installed during the war; but now only Berne continues the practice—for the enrichment of its gas when necessary. As in former reports, a schedule of the observations made is included.

1.—General examination of working	11
2.—Defective safety appliances or bad maintenance of the latter	6
3.—Insufficient enclosure of parts of works	3
4.—Lack of notices, "no admission" or "no smoking"	9
5.—Improper doors and windows	2
6.—Confined placing of appliances and conduits, causing difficulty of access and control	7
7.—Control of temperature in coal store	—
8.—Non-provision of indicating plates on valves	12
9.—Defective manometers, &c.	19
10.—Wood flooring in revivification sheds	3
11.—Defects in gasholders and heating appliances for them	8
12.—Defects in ammonia and tar mains and in syphon pots and cisterns	11
13.—Lighting and heating by open-flame burners, insufficient lighting, &c.	6
14.—Improper electric appliances (motors, switches, fuses)	11
15.—Insufficient ventilation, defective windows	2
16.—Accumulation of inflammable material	1
17.—Insufficient indication of degree of opening of valves.	11
18.—Absence of protecting glasses for incandescent electric lamps	16
19.—Defective carbonizing plant	34
20.—Defects in hydraulic main and chief works conduits	8
21.—Lack of order and cleanliness	7
22.—Cautions for safety not displayed nor circulated among workmen.	4
23.—Doors opening inwards	—
24.—Plans of works not available	—
25.—Works books not brought up to date	3
26.—Plans not submitted before alterations or new construction	4
27.—Coal store of wood	—
28.—Defects in conduits	—
29.—Non-observance of safety rules for acetylene plant	—
30.—Defects in accessory plant	—

The number of works which have given no cause for comment has increased to 11; while the aggregate of complaints has very notably decreased, and leads to the belief that undertakings are doing their best to conform with the measures prescribed by the Inspectorate. No. 1 of the schedule refers chiefly to defective purification—various works supplying gas insufficiently purified from sulphuretted hydrogen. As remarked in the previous report, it is supposed that the defect is due to the works in question, during the days of wood distillation, having become accustomed to their purifiers requiring little change. They do not realize that

English and American coal, with its high sulphur content, rapidly exhausts the oxide. Purifiers should receive daily attention.

No. 10 shows that three cases existed of revivification sheds having wooden floors, presenting considerable danger of fire in the event of the material overheating. One of the works has now fireproofed the floor with a covering of cement—an example it is hoped will be followed by the others.

Plans for twenty-one new installations have been submitted, including those for a water-gas and for a benzole plant for average-sized works. The managers of these works are requested to keep the Society informed of their experiences.

This year, no single accident has necessitated a special visit by the Inspectorate. The wooden retort-house roof of a small gas-works was burned, without further damage being incurred; while in two cases the whizzer of a centrifugal sulphate dryer burst, breaking the framework in each case, but fortunately incurring no casualties. In one instance this was due to excessive corrosion; in the other to breakage of the drum shaft.

The Inspectorate has again co-operated with and advised undertakings on a variety of points, among which two are of particular interest. A small works was recommended to instal coke-discharging machinery, which has proved eminently successful; the increased make fully compensating, in these days of swollen coal prices, for the outlay on the installation. Some works have had considerable trouble with their horizontal condensers of drawn-iron pipe; the water, owing to its high acid and oxygen content, having caused serious corrosion and even eaten through the iron. Heavy expenses are thus incurred; and it is difficult to find efficient protection for this drawn pipe. Most of the dressings used last but a short time; though dehydrated tar, if regularly renewed, is effective enough. One works has got over the trouble by applying a cement grouting; while Prof. Zschokke advocates the addition of certain chromium salts to the water. The latter, however, entails the duplication of plant to avoid the loss of the salts; and this is likely to prove an obstacle serious enough. Thus cast-iron pipes are likely, in spite of their disadvantages of weight and dimensions, to come again into favour. Another works sought information as to burners which would permit the combustion of pitch under boilers. After careful inquiries of a firm that had experimented on this line, they were informed that attempts to do so had failed, owing to the difficulty of liquefying the pitch and on account of its incomplete combustion. The Inspectorate has this year succeeded in arranging for the exchange or the handing-over between works of serviceable apparatus which has become surplus. The works concerned settled the terms—the Inspectorate being only an intermediary.

A cantonal fire committee requested an opinion on the marketing of apparatus for enriching town's gas with benzene or benzole. The reply was that appliances necessitating the handling of highly inflammable liquids should not be permitted in household kitchens. For industrial purposes, however, they might be installed by special authority.

Much attention has been paid to plans submitted by a firm making small wood-gas plants for use in districts lighted by neither gas nor electricity. Though it is unlikely such installations will be widely used, attention has been called to necessary precautionary measures.

Numerous other small matters are touched on in the course of the report—queries and decisions on everyday practice, which are not noticed in this *résumé*.

VISIT TO THE WORKS OF THE DERBYSHIRE SILICA FIRE-BRICK CO., LTD.

AT the invitation of the Derbyshire Silica Fire Brick Company, about eighty members of the Manchester Association of Engineers visited the Friden Fire-Brick Works on the 25th ult. The party travelled from Manchester in motor cars lent by members of the Association. Lunch was taken at the Palace Hotel, Buxton. The party was conducted over the works by Mr. Fred. J. West, C.B.E., the President of the Association, and each member was provided with a printed history and description of the works. The visit was somewhat out of the ordinary for the Association; many of the members being unfamiliar with the clay industry.

After a most interesting description and demonstration of the manufacture of the silica and fireclay materials from the "getting" of the various classes of clay at the pits to the dispatch of the finished articles at the railway sidings, tea was taken in a marquee on a field adjacent to the works. The party motored *viâ* Bakewell and Buxton back to Manchester.

From the printed description of the works and operations, we take the following:

The Derbyshire Silica Fire-Brick Company was established in 1892 to manufacture highly refractory materials for gas-works, coke-ovens, furnaces, &c., from the silica deposits in the High Peak district of Derbyshire. The works are situated near, and connected by siding to, the High Peak Railway, and are fitted up with the most up-to-date plant and machinery for the grading, blending, drying, and burning of the material.

The firm are working three pits: Friden Old Pit, 200 yards west of the works, and just north of Cabins Plantation; Washmere Pit, ¼ mile south of the works, near Old House Farm; and Blakemore Pit, 1½ miles north-west of the works, near Abor Low. They have recently opened a new pit at Kenslow.

The materials in these pits are of the usual character—white and grey argillaceous sands making up the bulk of the deposit in each. Friden Pit is the largest—about 80 ft. deep and 100 yards square. The following variety of materials are recognizable in the pit: Grey sand, "ganister," white sand (argillaceous), grey clay, white clay, and "soapy" white clay. In the Washmere Pit, which is shallower, from 12 to 30 ft. of grey argillaceous sand is exposed. There is also a little white clay and some sand almost free from clay. The contents of the Blakemore Pit are more irregular in character. Pebbles, which are not abundant at the other two pits, are here numerous; and a small amount of black clay and a greenish clay occur. In none of the pits has the deposit been bottomed; and in the case of Washmere the evidence of old lead mines points to a large extension in the immediate neighbourhood.

The raw material from the three pits is sorted at the pits and the works; different grades being stored separately. Some of the clay is dried before grinding and mixing. When prepared, the ground mixture is fed by a bucket elevator on to a belt-conveyor which runs over a series of large bins, into which it drops its load as required. The clay is soaked with water while on the conveyor. The wet mass then remains in the bins for about a week; this process facilitating subsequent manipulation.

The silica is carefully selected and made up into three qualities or grades to suit various conditions. Grade "S" is used in gas-retort settings in the combustion chambers, working at temperatures ranging from 1200° to 1500° C.; Grade "B.B." is used in temperatures from 1000° to 1200° C.; Grade "O" in temperatures from 800° to 1000° C.

The following are analyses of the three grades produced:

	Grade "S."	"B.B."	"O."
Silica	91·60	89·27	87·23
Titanic oxide	0·46	0·77	1·85
Alumina	6·32	8·53	8·55
Ferric oxide	0·30	0·84	1·25
Manganese oxide	—	—	—
Magnesia	0·21	0·23	0·10
Lime	0·26	—	0·28
Potash	0·85	0·20	0·54
Soda	0·18	0·80	0·36
Loss	0·90	0·05	0·25

Blowing Naphthalene Out of Mains.

The Atlanta (Ga.) Gas Company have recently designed and put into operation a blower for removing naphthalene from the pipes, which is believed, says the "American Gas Journal," to be the first device of its kind that has been employed by any gas company in the United States. So much more efficient is it than the old hand-apparatus, that two men can do the work more quickly and more thoroughly than four or five men used to be able. A 3-H.P. gasolene engine has been directly connected to an air compressor, having a capacity of 18 c.ft. of free air per minute. There is a receiver for air storage to 100 lbs. pressure, 100 ft. of 1-in. hose on a reel, and a spare tank to act as an air receiver that can be carried into the house for blowing services where the location of the trouble cannot be reached with the hose. The whole of this outfit has been mounted on the rear end of an ordinary Ford chassis; but while it weighs only 550 lbs., it is a dead weight, and therefore it has been found necessary to fit an additional spring to the car. The device has proved itself to be both a time and a money saver.

Natural Gas Project for St. Louis.

An agreement has lately been filed in connection with a project which will embrace a natural gas pipe-line from Shreveport to St. Louis. A natural gas field has been developed in Southern Arkansas and Northern Louisiana, the area of which exceeds 250 square miles, and which has been estimated to contain upwards of 2500 billion c.ft. of gas, which is worth at the well (at prices now prevailing in Oklahoma and other fields) $250,000,000. It is claimed that, considering area, quantity, and value, this field is superior to any natural gas deposit heretofore known in the world; and as local markets are limited, the agreement to secure a wider distribution has been entered into by the Union Power Company, who own approximately one-fourth of the area named, and so control upwards of 600 billion c.ft. of natural gas. The agreement provides for the securing of further reports from competent engineers on various matters, including the size of pipes required, the number of pumping-stations, and the estimated cost of carrying out the work, as well as for negotiations with the other owners in the field for the natural gas from their lands to be handled through the proposed pipe-line facilities. Subsequently the points of ultimate distribution will be determined between the parties. The arrangement is that landowners, or owners of mineral rights or leases, as the case may be, shall be paid 50 c. per acre, beginning with Jan. 1, 1922, and $200 per well per annum, with a minimum of 3 c. per 1000 c.ft. for gas furnished to the trunk line, measured at the well under customary pressure and conditions.

Estate of the gross value of £4624 has been left by Mr. John Wilton, late Engineer of the Silvertown and Bow Common works of the Gas Light and Coke Company.

COKE FUEL FOR WATER HEATING.

Experiments on Relative Efficiencies.

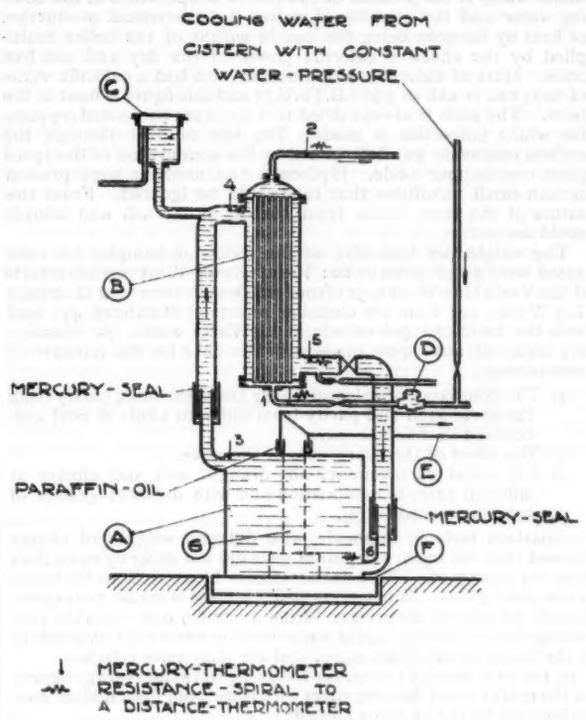
In the course of a recent lecture before the Swedish Society of Engineers and Architects, at Stockholm, Mr. K. Lidberg described an extensive series of tests made for the purpose of obtaining definite data respecting the thermal value of coke of various descriptions when employed as fuel in the boilers used in domestic and public establishments for the supply of hot water.

For many years past, the chief part of the coke from the Stockholm Gas-Works has been consumed as fuel for such boilers. It has been produced in hand-charged horizontal retorts or in Glover-West verticals; and of late years it has not been quite able to hold its own against the heavier imported coke (chiefly English) from mechanically charged retorts. Inasmuch as an extension of the gas-works was under consideration, it was thought desirable to discover if the heating value of imported coke having a greater weight per hectolitre was so much more as to justify laying down suitable carbonizing plant, or if further means (chamber carbonization) should advisedly be taken in order to obtain the qualities of foundry coke. Investigation in Germany had showed that for many years past there had been keen competition between gas coke and foundry coke for the central-heating of boilers; the latter being preferred mainly on the ground that its higher density permitted a greater weight of charge, but also to some extent for the alleged reason that the foundry coke gave less loss through carbon monoxide than gas coke. But these were found to be simply opinions unsupported by specific tests. Plant for the latter was accordingly built at the Stockholm Gas-Works.

The plant [see diagram] consists of a Strebel cast-iron boiler of the upper-combustion type, and of 10 sq. m. heating surface—the spent gases traversing the whole of the coke before passing away by a flue at the bottom. The boiler A is mounted on a balance F, showing 0·1 kilo., equivalent to 1-20,000th of its charge. The hot-water chamber is connected with a so-called Topsy cooler B, through mercury seals. The boiler and flue for the waste gases are flexibly connected by seals of heavy paraffin oil. The temperatures at the inlet and outlet of the cooling water were measured, at 1 and 2, by mercury thermometers and electric resistance coils attached to a common distance thermometer. The temperature of the hot water was measured at 3, 4, 5, and 6; and a water-meter at D served to determine the volume of cooling water. At G a pipe takes off the spent gases for testing; and their temperature was recorded at this point. The pressure in the flue is also taken at G by a differential manometer, the two fluids in which are concentrated and dilute carbolic acid. C is the expansion vessel, and E the conduit conveying the spent gases to the chimney.

It will thus be seen that, provided the hot-water conduits and the cooler are well isolated, the heat absorbed by the cooler is equal to the useful heat produced during the same time by the fuel—that is to say, if the quantity of heat in the boiler itself is the same at the end of the test as at the beginning.

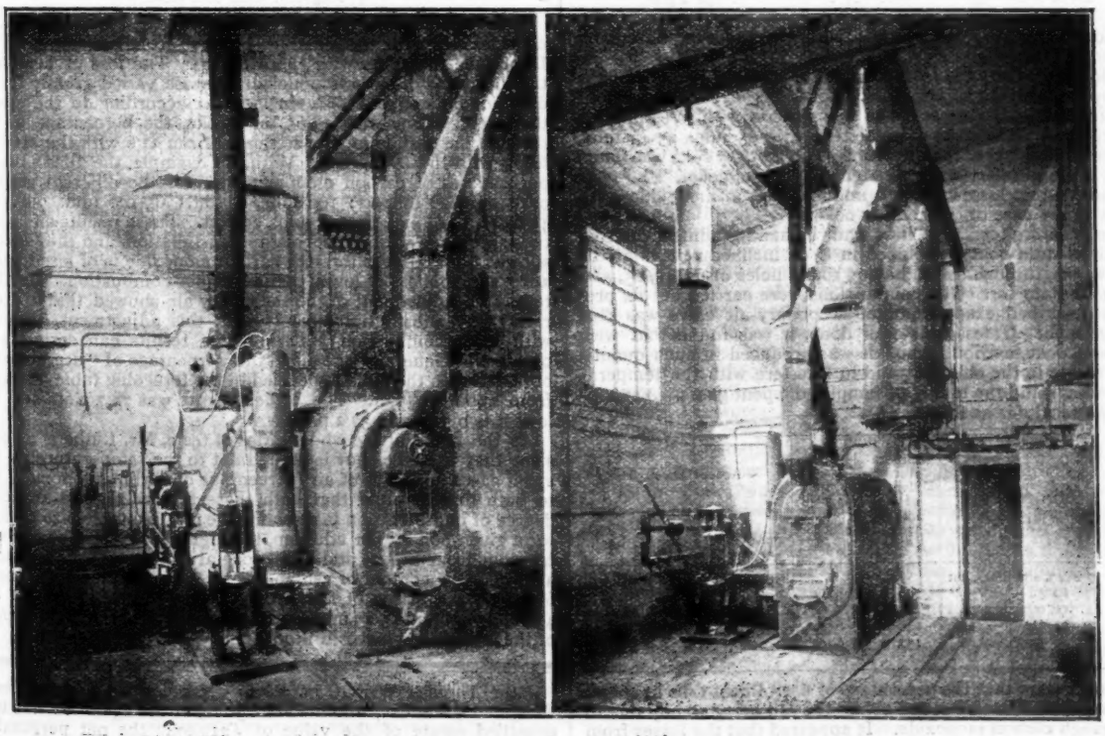
In making the tests, the boiler was first charged with a normal weight of the fuel and this latter burnt to the lowest possible thickness on the bed of the furnace. The test proper was then made. The boiler was filled with the charge of fuel, and combustion continued until the boiler weighed the same as at the beginning of the test except for the ash from the coke consumed.



A. Heating-Coil. B. Cooler. C. Expansion-Vessel. D. Water-Meter. E. Smoke-Flue to Chimney. F. Platform for Weighing Machine. G. Testing-Place for Smoke-Gases.

Conditions being thus the same at the beginning and the end of the test, the heat absorbed by the cooler is a measure of the useful heat of the fuel. Losses of heat in the spent gases, and through carbon monoxide in the latter, were determined by temperature readings of the air supply and spent gases, and by analysis of the latter. The total effective heat of the coke was ascertained from the calorific value (after deduction for moisture), and the useful water-heating effect was expressed as a percentage.

In order to obtain reliable indications from the tests, it was found important to maintain the combustion of the fuel as steady



THE COKE TESTING-PLANT OF THE STOCKHOLM GAS-WORKS.

as possible, and to employ the cooling water at a constant rate. The coke should also be uniform in quality. During the burning of a charge, temperature readings are taken every fifteen minutes, and analyses of the spent gases at the same intervals. Combustion is kept constant by automatic regulation of the furnace damper.

For the calculations, the total quantity of heat supplied to the boiler water is the product of the rise in temperature of the cooling water and the quantity of water; the theoretical production of heat by the coke being the loss in weight of the boiler multiplied by the effective calorific power of the dry and ash-free coke. Most of the coke experimented with had a calorific value of 8075 cal. (1 cal. = 3·968 B.Th.U.); and this figure is used in the tests. The coke is always dried to a moisture content of 0·5 p.ct., for which correction is made. The loss of heat through the carbon monoxide was determined by the combustion of the spent gases over copper oxide. Hydrogen and methane were present in such small quantities that they could be ignored. From the nature of the tests, losses from carbon in the ash and clinker could not occur.

The weight per hectolitre of the following samples for coke tested were ascertained to be: From Glover-West vertical retorts at the Varta Gas-Works, 32; from the Dessau retorts at Hamburg Gas-Works, 42; from the chamber retorts at Hamburg, 44; and from the hand-charged retorts at the Varta works, 36. Successive series of tests were made with the coke for the purpose of ascertaining:

(1) The comparative value of heavy and light coke, partly from the same kind and partly from different kinds of coal carbonized in different ways.
(2) The effect of the coarseness of the coke.
(3) The effect of secondary air, draught, ash, and clinker at different rates of combustion and with different grades of coke (as regards size).

Comparison tests, in duplicate, with different weights of charge showed that the mean of a pair of tests did not differ by more than from 0·3 to 2·5 p.ct. These were exclusive of corrections for losses in the spent gases. When allowance for these is made, the experimental differences are greater—from 2·3 to 6·9 p.ct.—but the percentage figures for the useful water-heating effect are independent of the losses in the spent gases, and are thus quite reliable.

In the first series of tests, the following were the average figures for the useful water-heating effect with coke from Pelton Main coal carbonized by the systems named:

	P.Ct.
Glover-West vertical retorts, Varta works	79·3
Hand-charged horizontal retorts ,,	76·8
Dessau vertical retorts, Hamburg	81·5
Chamber retorts ,,	81·5
,, ,, ,,	83·0

The figures of which the above are the average show that there is little to choose between dry and wet quenching, and that the useful effect falls as the rate of combustion is greater. In these tests, sufficient attention was not paid to the grading of the coke as regards weight per hectolitre. When, however, this was done in a further series of tests with coke from Londonderry coal, the average results showed no appreciable difference between light and heavy coke—viz.:

	Useful Effect.
Light coke	78·4 p.ct.
Heavy coke	78·3 ,,

The foregoing tests were made with coarse coke, of greater coarseness than 50 mm.

Tests were next made to determine the effect of the size of the coke by undertaking a series of combustions of coke of various sizes from the Varta works in comparison with Westphalian foundry coke. The sizes examined were 15-25 mm., 25-45 mm., 45-65 mm., and larger than 65 mm. The foundry coke was found to give a useful effect 1·1 p.ct. higher than gas coke. The tests also showed that losses through unburnt carbon monoxide were smaller in the case of the coarser cokes.

More accurate tests were next made by hand-grading coke from the Pelton Main coal carbonized in Coze inclined retorts at the Varta works, through sieves having round holes of 65, 45, 25, and 15 mm. in diameter. The combustions were carried out as previously described, except that the secondary-air valve was kept slightly open. Unless this was done, it was found that with 15-25 mm. coke, carbon monoxide was produced in such quantities as to fire in the chimney, and to interfere with the temperature readings and the taking of samples of spent gases. A synopsis of the results is as follows:

Piece-Size.	CO_2.	CO.	Temperature Difference of the Smoke-Gases and Air.	Useful Heat.	Losses Through		
					Temperature.	CO.	Others.
Mm.	Per Cent.	Per Cent.	°C.	°C.	Per Cent.	Per Cent.	Per Cent.
>65	10·52	0·59	120·6	80·1	8·6	3·9	7·4
45-65	11·06	1·78	125·8	76·9	7·6	8·5	7·0
25-45	10·98	4·10	140·6	65·1	7·3	20·1	7·5
15-25	9·55	4·81	151·8	60·4	8·2	24·3	7·1

The figures show that the percentage of useful heat falls in correspondence with the size of the coke—the fall being wholly due to loss through carbon monoxide. It appeared that the losses from carbon monoxide are almost independent of the rate of combustion, while the reverse is the case as regards temperature losses. These are independent of the size of the coke, but increase with the rate of combustion.

The tests having shown very plainly the rapid increase of carbon monoxide as the size of the coke decreases (with considerable reduction of useful heating), a further series was undertaken with a view to discovering the possible benefit obtainable by regulating the secondary air. In the previous tests the aim had been to secure comparable results, and therefore the functioning of the boiler was kept as constant as possible. Attention was next given to adjusting the draught and the secondary air in order to obtain the most economical combustion of coke of different sizes. The automatic draught was regulated so that the primary air was admitted only sufficiently to give the proper rate of combustion for the test. Coke of sizes greater than 65 mm. and 45-65 mm. was then tested with closed, half-closed, or open damper; and the 25-45 mm. size only, with the damper full open. The 15-25 mm. size was not tested, since it was seen that perfectly efficient combustion of it was unattainable in this boiler. The results showed that, with coke of a size greater than 65 mm., the greatest efficiency was obtained with the damper wide open; but the benefit was comparatively small, since losses through temperature increase nearly as fast as those from carbonic oxide decrease. Since the liability to loss by excess of air is greater than that from carbon monoxide, it is best to keep the damper closed during regular working. On the other hand with 45-65 mm. coke the maximum efficiency was obtained with the damper wide open—the result being about 5 p.ct. better than with the damper closed. The 25-45 mm. coke was unsuitable for this type of boiler, owing to the loss from carbon monoxide reaching 12 to 15 p.ct. with the damper wide open.

The foregoing tests with the experimental installation having shown the effect of the chief variables—in particular the size of the coke—a series of measurements was made (though in a somewhat less precise manner) of the efficiency of various types of commercial boiler. The boilers examined were as follows:

Name of the Boiler.	Heat System.	Number of Boilers Installed.	Heating Surface per Boiler.	Number of Sections.	Boiler Length	Magazine. Volume Litres.	Max. Fire Height	Manner of Combustion.
			M^2.		Mm.		Mm.	
Hellefors S2 Series II. W.	Hot water	1	11·7	8	1060	320	350	Lower.
Ideal No. 850	Steam	4	17 0	8	1600	600	700	Upper.
Furman Kessel	,,	2	8·8	6	1200	200	460	Upper.
*Dahlgrens.	,,	6	16·95	—	2920	300	310	Lower.
Strebel. Series III.	Hot water	3	12·5	9	1140	350	850	Upper.
Strebel. Catena.	,,	10	22·6	14	1820	800	750	Upper and lower.
Ideal. 3 B6	,,	2	7 4	6	1030	300	670	Upper.
Merking	,,	3	17·5	8	1120	520	350	Lower.

* Forge-iron boiler with tubes.

It was found that the heat losses from the spent gases varied considerably with the different boilers—from 16 p.ct. with the Dahlgrens to 7 p.ct. with the Merking. The loss of heat from the formation of carbon monoxide likewise varied greatly for the different boilers, and for a single boiler according to the size of the coke. Thus with 45-65 mm. coke, the percentage of loss through the carbon monoxide ranged from 21·6 with the Merking to 0·5 with the Dahlgrens. With, for example, the Ideal B6, the percentages of carbon monoxide loss for the different sizes of coke were as follows: 100 mm., 3 p.ct.; 65-100 mm., 7·8 p.ct.; 45-65 mm., 14 p.ct.; 25-45 mm., 29 p.ct. These results confirmed those obtained with the special test installation, and they further showed that the loss through carbon monoxide is of less importance with boilers of lower than of higher combustion. Further, tests with adjustment of the secondary air showed that there is rarely any substantial advantage in this adjustment, although with lower-combustion boilers better results can certainly be obtained. Generally speaking, the percentage of "useful heat" obtained with the boilers specified in the foregoing table averaged from about 70 p.ct. The highest figure was 78·7 p.ct., and the lowest two 51·7 and 37·2 p.ct.

As the result of the whole series of tests, Mr. Lidberg emphasizes that the efficiency is related not to the temperature of the spent gases or excess of air (percentage of carbon monoxide) but to both together, and that both these factors require an equal degree of consideration in selecting the most suitable size of coke for a given boiler. In addition, the high density of the coke and freedom from breeze and small coke are advantageous features, as is also low content of ash and water. In practice, it has been found that a series of four sizes of coke—viz., larger than 80, 45-80, 25-45, and 15-25 mm.—are sufficient for the current supply of the boilers employed in Stockholm.

Sir Thomas Wrightson, Bart., Chairman of Messrs. Head, Wrightson, and Co., who died last June, at the age of 82, has left unsettled estate of the value of £212,074; the net personalty being £91,881.

WORKS PLANT FOR TAR DISTILLATION.

By M. DE SAVIGNAC.

[A Paper read at the Tours Meeting of the Société Technique du Gaz en France.]

In order to eliminate the cost of transport of tar to the distillery, the author has applied himself to the design and construction of a distillation plant suitable for use in works of comparatively small size—that is to say, those producing an annual make of tar of from 200 to 2000 tonnes. He has endeavoured to devise an installation which should be as capable of general employment as the plant commonly used for the treatment of ammoniacal liquor. Hence the aim has been to keep the cost low, to allow of the treatment of comparatively small quantities, to make the working almost automatic (and as far as possible independent of manual labour), and to produce directly saleable products of the maximum possible purity. These conditions are evidently inconsistent with a system of intermittent distillation; while it was considered that none of the numerous systems of continuous distillation fulfilled all the required conditions. Such systems were judged practical only for the daily distillation of from 20 to 30 tonnes, the process consisting in passing the tar successively into chambers where it is brought to a continuously higher temperature, and the distillation product caused to pass into special coolers or separators.

A different method of treatment has here been adopted. It was found that the tars from certain Loire coals gave rise to continual complaints from the distillers. Analysis showed that tars obtained with a considerable proportion of Montrambert coal, distilled at a high temperature, frequently contained 12 to 20 p.ct. of water, and sometimes more than 25 p.ct. Practical tests based on the experiments of M. Ab der Halden (communicated to the Toulouse Congress of 1913) showed that many of the difficulties of distillation might be avoided by working on the principle that in the distillation of two insoluble liquids the numbers of molecules passing over are proportional to the vapour tensions of the two substances at the temperature of distillation. By passing steam into the mass of tar, even the heavy oils could be removed without greatly raising the temperature. If, however, only steam at 100° C. was employed, products of low vapour-tension were removed very slowly.

The process thus consists in subjecting the tar at a temperature of 200° to 250° C. to superheated steam at 250° C. All the volatile products are removed together, and are condensed in a series of coolers which they successively traverse. The presence of the steam carries over the more volatile products from the first coolers. The apparatus thus works continuously—the coal tar passing through the system in the opposite direction to the vapours from the still, and becoming heated in the course of effecting the condensation of these latter.

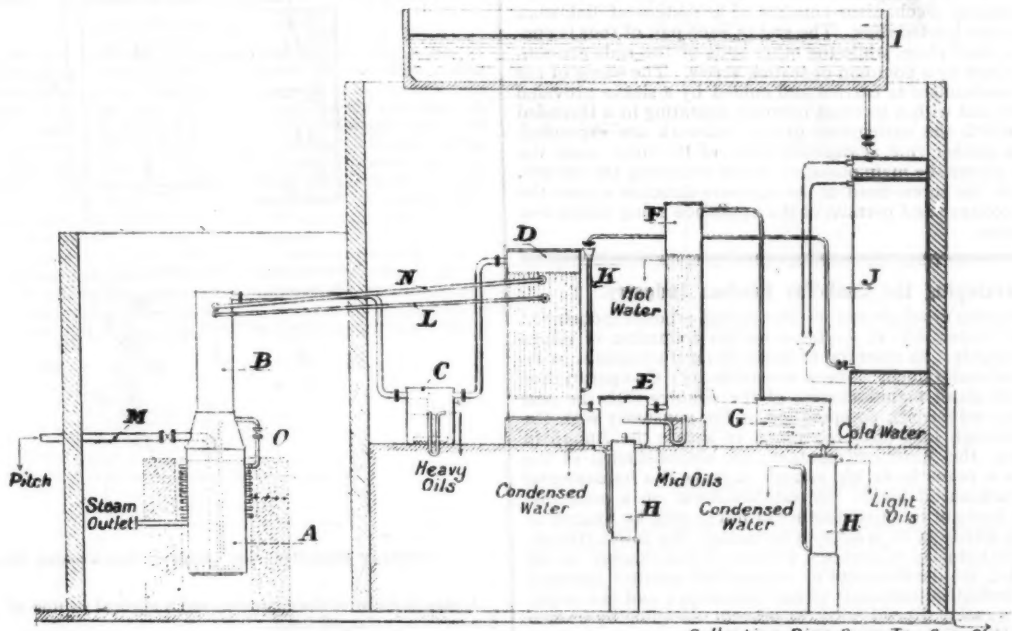
As shown in the diagram, a cylindrical retort A has above it a still-head B fitted with elements which break-up the tar which enters at the upper part. The retort is heated directly by gaseous fuel. A separator C receives the heavy anthracene oils condensing on the outlet of the still. An outlet pipe keeps them at a constant level; and the inlet pipe delivering the vapours dips to the bottom of the separator so as to subject the mid-oils and naphthalene to a second extraction by the steam. The temperature of the separator can be lowered by the introduction of steam at 100° C. by a pipe at its inlet not shown in the drawing.

Emerging from C, the products pass into a tubular condenser D, where they give up part of their heat to the tar to be distilled. They traverse the separator E, and the reflux condenser F. The latter is cooled by water, the temperature of which is adjusted for condensation of the mid-oils in the separator. Uncondensed vapours next pass into a coil G immersed in cold water and marking the final point of condensation. The separators H collect the oils freed from water.

The tar to be distilled passes from the storage tank I through a filter to the tank J, where it is kept at the constant level necessary for regular working. It enters by the pipe K into the condenser D, becoming heated and passing to the still by the pipe L. In the still it runs-down over the dividing elements (moving in the opposite direction to the current of steam), and finally reaches the boiler A provided with the pipe M for the discharge of pitch.

Since the tar invariably contains a certain proportion of water, the condenser D is designed to effect its dehydration; and, as a safeguard against interference with circulation by the froth and vapours produced in this operation, the latter are led to the still-head by the pipe N.

The steam for distillation may be raised by any convenient generator—even one of low pressure. It is passed through a coil superheater surrounding the retort, the degree of superheating depending on the temperature of the latter. The steam enters the retort by the pipe O, and is delivered below the liquid to be distilled. It subsequently traverses the whole installation without further pressure than that which will ensure the necessary



Collecting Pipe From Tar Overflow

agitation of the liquids in the separators and overcome the opposition of the various heights of these liquids.

The installation is under ready control; for it is easy to regulate the quantity of tar delivered, the heating of the retort, and the quantity of steam, in order to obtain a pitch of greater or less consistency. The proportion of products condensed as heavy oils is adjusted by admission of steam to the condenser C; and the adjustment of the supply of water to the condenser F further serves as a means of adjusting the separation of the mid and light oils. When the adjustments have once been made, the products obtained during a continuous run of the installation are of invariable composition, depending only on the temperature of the vapours at the outlet of the still. This is the only temperature which the workman has to watch, after the preliminary adjustments have been made.

The first installation was set up in 1920 at the Montargis Gas-Works, and was designed for the distillation of 300 kilos. of tar per twenty-four hours. It was, however, found able to distil from 400 to 500 kilos., and has been working very satisfactorily for over a year. At one time it was in continuous working for more than three months, after which period it was found that the deposit of coke in the still-head was only a few millimetres thick. A second installation, of a capacity of 5 to 6 tonnes per twenty-four hours, has recently been started at Nimes; and one for 15 tonnes per twenty-four hours has just been erected at Nomexy (Vosges). M. Savignac is of opinion that the process is the only one dealing economically with daily outputs of from 1 to 15 tonnes. The plant occupies small floor-space, and calls for very little manual labour. It is found that the pitch, owing to its low temperature and constant agitation by the steam, does not suffer decomposition by heat and is of good agglomerating power.

THE FAISOLLES CLOSURE FOR GAS-MAINS.

By M. BACHELAY.

[A Communication to the Tours Congress of the Société Technique du Gaz en France.]

This apparatus—designed by M. Adolphe Faisolles, of the Toulon Gas Company—is designed to provide a more efficient substitute for the flexible bags or bladders commonly used for the temporary stopping of mains, but very readily damaged while being put in place in the main by the burr left on the internal surface of the metal by the cutting-tool. Moreover, the Faisolles appliance is much more quickly brought into operation, forms a perfect seal in the main, and is free from the inconveniences of pumping and wedging required when employing the older devices. Further, the repair of the rubber parts of the appliance may be readily carried out on the spot by any workman able to fix a patch on a cycle tyre.

The closure in the main is produced by a rubber diaphragm or membrane, attached to mechanism by which it can be expanded within the main. It is provided with an outside rubber ring, about 6 mm. thick and 2 to 3 cm. high, and having a groove on its external circumference. The ring forms the seal with the internal surface of the main; while the groove in it is provided for the accommodation of the rivets which fix the ring to the extension mechanism. When necessary, the ring may be coated with thick grease in order to prevent the rubber from sticking to the tar which is often present as an internal coating on the main. The membrane itself is of rubber, about 1 mm. thick, and of more elastic quality than that used for the ring.

The extension mechanism consists of a system of link-work formed by four jointed rods. The end of each pair of rods is connected to a steel plate, while the other ends of the rods are connected to a rod by a common operating screw. The whole of the extension mechanism is carried and guided by a sleeve provided at its upper end with a screwed member operating in a threaded tube, by which the extremities of the linkwork are expanded, forcing the rubber ring against the walls of the tube, while the membrane closes the main passage. When removing the closure, operation of the screw-head in the opposite direction causes the closure to collapse and permits of the appliance being withdrawn from the main.

Developing the Coal-Tar Product Industry.

Discussing the development of the coal-tar product industry in the United States, Mr. E. C. Reese quotes a number of things which he regards it as essential to bring about if success is to be obtained and maintained. These essentials are: Co-operation of the acid and alkali manufacturers of the country with the coal bye-products industries; co-operation of the consumer with the producer through long-term contracts, to assure the American manufacturer the American market; the establishment of the industry on a peace basis big enough to make it a fundamental factor in national defence; the establishment on a profitable commercial basis of the manufacture of nitric acid, by fixation of atmospheric nitrogen, as is done in Germany; the internationalization of the industry to ensure a balance world market for all bye-products; the development of a twentieth century common school and industrial technical school education; and the maintenance of a rational tariff so as to prevent dumping by foreign countries. How Germany continues so long to turn out these products so cheaply, even by subsidizing her industries, is, he says, difficult to understand; but the fact emphasizes the essentials just quoted.

Coal Weight Allowance for Pile Settling.

One of the replies by Mr. W. M. Henderson, of the Pacific Gas and Electric Company, in the problem column of the "Gas Age-Record" [a recent consolidation of our American contemporaries the "Gas Age" and the "Gas Record"], is to the following question: "In figuring coal in a storage pile, what allowance in weight per cubic foot is made for the pile settling?" Mr. Henderson says that an exact figure could not be given without an actual determination on a large scale under the desired conditions; and the result thus found would probably apply only to piles stored under about the same conditions. The shrinkage would depend upon such factors as the size and other physical characteristics of the coal, the shape of the pile, whether protected or exposed to weather, length of time in storage, and so on. As bearing on the estimation of weights per cubic foot, the subjoined figures, obtained from small-scale experiments, might, he thought, be of interest: Weights per cubic foot of freshly mined gas coal from Pittsburg seam—(1) ¾-in. screened lump, loose-piled, containing practically no fines below ¾ in., 53 lbs.; (2) run of mine, 54½ lbs.; and (3) slack for same, through ¾ in. bar screen, 49¼ lbs. An extreme condition, under which screened coal (1) would become so reduced as to resemble the run of mine condition, (2) having the interstices filled with fines, would according to the above lead to an increased weight of 1½ lbs. per c.ft., or nearly 3 p.ct. This result, however, could hardly be met with in practice; and in all probability 1 p.ct. would serve as a maximum allowance to cover any increase in density which would be likely to take place in a coal-pile due to settling.

REGISTER OF PATENTS.

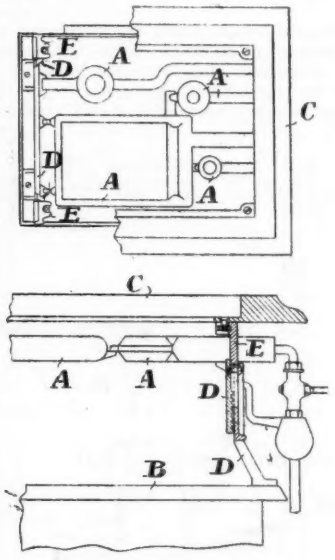
Gas-Cooking Ovens, &c.—No. 165,267.

BRENTFORD GAS COMPANY, and JENNINGS, G. L., of Gunnersbury.

No. 10,854; April 19, 1920.

In ordinary gas-cooking stoves, the patentees remark, the bars, grid, and hot-plate are placed at a fixed distance above the burners. This "feature of construction is objectionable because of the varying composition of gas supplied to consumers. Some of the gas consists of coal gas alone, while other gas consists of a mixture of coal and other gases. In addition to being of different composition, gas is supplied at varying pressures." To obtain efficient combustion of the gas supplied, and avoid the smell of unburnt or partially burnt gas, it is necessary that the burners be located at a distance below the bars, grid, or hot-plate corresponding to the composition and pressure of the gas. For these purposes it has been proposed, in the case of a gas-cooking stove in which the hot-plate consists of a water-heater, to support the burners on a plate or tray and to adjust its position with respect to the hot-plate, or, conversely, to adjust the position of the hot-plate with respect to the burners.

According to the present invention, the top of an ordinary gas-cooking oven—that is, the part supporting the bars, the grid, or the hot-plate—is made separate from the rest of the oven, and is supported from the crown-plate in such manner that its distance from the burners can be regulated. This is effected by means of brackets on the crown-plate and depending parts on the part supporting the bars, grid, and hot-plate adapted to be secured in the adjusted position to the brackets.



Jennings' (Brentford Gas Company) Gas-Cooking Stoves.

A plan is given of the gas-oven, and a vertical section of part of it, drawn to an enlarged scale.

The gas-burners A are located above the crown-plate B; while C is the part supporting the bars, grid, or hot-plate. D are brackets secured to the crown-plate and E are depending arms. The brackets and arms are formed on their opposed faces with teeth of knuckle shape; while the depending arms are secured in the adjusted position on the brackets—that is to say, the part carrying the bars, grid, or hot-plate is supported at the required distance above the burners by means of screws passing through slots and engaging with tapped holes. The distance will, as mentioned, depend on the quality and pressure of the gas in use.

Purification of Liquids.—No. 152,356.

KOPPERS COMPANY, of Pennsylvania; Assignees of E. A. DIETERLE and S. D. SEMENOW, of Pittsburg.

The invention relates to the purifying of the waste liquor from the ammonia stills of the bye-product coke industry "so that they may be discharged into streams without polluting the water."

The present process has to do with the removal of waste substances of the ammonia still, which "produce a harmful effect on fish, a disagreeable odour and taste, and a dark colour." The liquor is drawn from the still while hot and aërated, preferably by running it through an aëration tower filled with baffles, coke, or other material, over which it trickles in contact with the air. This causes partial evaporation of the water and so to some extent concentrates the liquor. It also permits the evaporation of some of the volatile constituents of the liquid, and so gets rid of much of the disagreeable odour. The aëration of the liquid also causes a more ready precipitation of the solids in the subsequent step of treatment in the settling tank.

The liquor is next run into a settling tank, where it remains for about twenty-four hours, during which time about 95 p.ct. of the precipitable solids settle out of the liquid.

The liquid is then drawn from the settling tank and filtered through an inorganic material—preferably granulated blast-furnace slag. This completes the removal of the solids which do not settle-out in the

settling tank; and it also removes the tarry matter from the liquor. Also if the slag employed contains iron oxides such as are found in the spent slag which results from the treatment of mine water by the Heckman process, the sulphides are removed. This process consists in purifying water containing acids (such as mine water) by passing the water through a mass of granulated blast-furnace slag containing a substantial quantity of its original oxide of lime content. The sulphides exist in the liquor principally as calcium sulphides. The spent blast-furnace slag also partially removes some of the cyanogen compounds by the addition to the liquor of a compound such as a ferrous salt, which will precipitate the ferrocyanides followed by the addition of cupric sulphate and ferrous sulphate, which results in the precipitation of cuprous thiocyanate.

The above steps are for the purpose of preliminarily clarifying the liquor, whereby the burden placed upon the filter-bed of peat is lessened. The next step in the process is the treatment of the liquor with peat.

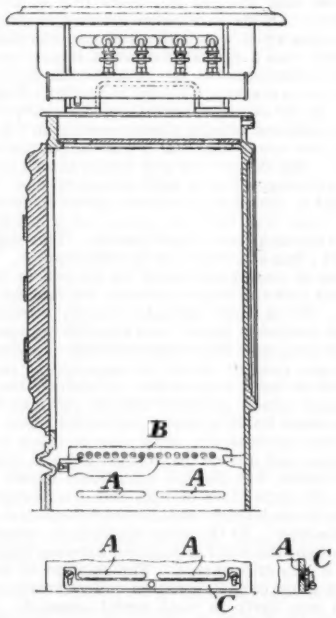
The patentees have found that a filter-bed of peat a foot or more in thickness is satisfactory. Such filtration permits a rapid treatment of the liquor, and effects a maximum removal of the phenoloid bodies with a minimum amount of filtering material. The liquor after this treatment is substantially colourless and substantially odourless, and when diluted in a stream is non-poisonous to fish-life and not harmful to the water for drinking purposes. Ammonia still liquors which contain a minimum amount of such solid impurities as sulphur and cyanogen compounds may be treated in the same way, without any preliminary treatment of the liquor. The liquor purified by this treatment with peat may, if desired, be passed through an earth filter-bed to effect the more complete removal of impurities before flowing into the stream.

Gas-Cooking Ovens, &c.—No. 166,688.

BRENTFORD GAS COMPANY and JOHNSTON, A. A., of Ealing.

No. 10,853; April 19, 1920.

According to this invention, the patentees remark, the action of ordinary gas-cooking ovens, &c., is controlled by the sizes of the openings by which air is admitted into the lower parts of the interiors. These openings are such that only the minimum air necessary is allowed to enter, and are of fixed size in cases where gas of known quality and pressure is to be used, but are regulated by adjustable shutters or valves when gas of different quality and pressure is supplied. The flue outlet of a gas-cooking oven is merely made of such a size as to allow of the ready escape of the products of combustion, and is placed in such position that unrestricted escape of the products of combustion will obtain. It has been proposed in White's patent, No. 23,033 of 1910, to provide the sides of the outer casing with a number of perforations controlled by regulators or shutters; but in this case no directions are given that the size of the openings shall correspond to the quality and pressure of the gas to be burned or shall be such that they can be regulated to correspond to any quality and pressure.



Johnston's (Brentford Gas Company) Gas-Cooking Stove.

The invention is illustrated by a transverse section of a gas-cooking stove, illustrating one way of carrying out the invention; also fractional views showing a second way.

A are openings for the admission to the interior of the body of the stove of the air necessary for the combustion of the gas supplied to the burners B. The openings are formed in any suitable positions in the lower part of the body of the stove. When the gas used is of known quality and pressure the openings would be of fixed size, but when an oven is to be used in cases where the qualities and pressures of the gas vary, the sizes would be regulated by any suitable arrangement of valve—for instance, by means of plates C adapted more or less to cover the openings and secured in an adjustable position by screws passing through slots formed in the plates and engaging with the body of the oven or stove.

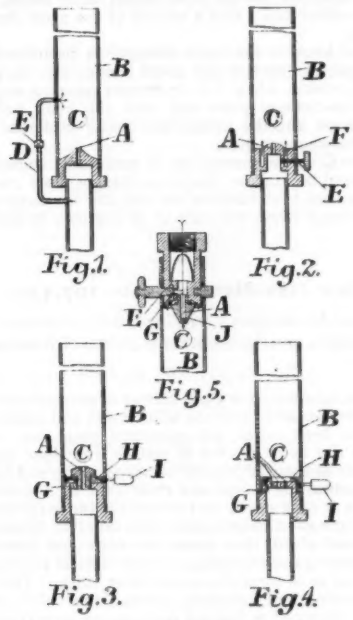
Injectors for Gas-Burners.—No. 167,218.

THORP, F. & H. T., of Whitefield, Lancs.

No. 9399; April 1, 1920.

This invention has for its object to construct a gas injector especially adapted for use with gas of varying quality.

The patentees remark: Injectors have up to the present been constructed with either a fixed orifice through which the gas passes, or with an adjustable orifice or series of orifices, the number of which can be varied at will. In all these devices, the jets of gas are used to inject air to mix with the gas. But when gas is mixed with air, where a bunsen flame is desired, there is an area of orifice most suitable for the quantity of mixture being consumed. Particularly is this the case in incandescent burners, where the flame should fit the mantle and be of a good mixture of gas and air. We provide gas orifices through which a definite quantity of gas is passed in a given time, and in conjunction with the gas inlets are inlets through which air is drawn by the injector action of the gas jets. But, in order to compensate for any variation in the quality of the gas and so ensure that a flame of approximately the same volume and character is produced, there are means for admitting a further supply of gas, which exerts no injective action on the air inlets, so that the rate of inflow of air is not materially varied. Such extra gas may be admitted to the gas and air mixture after it has passed the air inlets, or may be diffused into the mixture.



Thorp's Injectors for Gas-Burners.

In sectional elevation five forms of bunsen burner in accordance with the invention are shown. The ordinary gas supply is admitted at A; and, by reason of the velocity of exit of the gas, air is drawn into the tube B through the air orifices C. The quantity of gas which enters at A is fixed (not adjustable); and as this supply of gas alone exerts an injective action on the air required for combustion, the air supply also can be fixed and not adjustable. Should the quality of the gas vary, there is provision for the admission of a further supply of gas which may be diffused into the tube B or directed therein in such a manner that it exerts no injective action on the air-ports.

In the arrangement shown in fig. 1, the supplementary supply of gas enters by the tube D controlled by a valve E. In fig. 2, the supplementary supply of gas passes by way of the port controlled by the valve in the annular passage F, from which it diffuses into the tube B. In fig. 3, the supplementary supply of gas enters by the aperture G and impinges against the valve plate H, which can be turned by the handle I so as to cover the aperture and prevent the passage of gas or to allow the gas to diffuse into the tube B. The arrangement shown in fig. 4 resembles fig. 3, but the supplementary gas which is controlled by the plate H is directed into the main gas supply instead of outwards towards the surface of the tube B. In fig. 5, the gas-nipple J is detachable; and therefore the nipples are readily interchangeable. The gas from the passage G is directed against the back of the nipple and diffused into the tube B, which may be fitted with any particular type of incandescent burner either upright or inverted, or may be an ordinary open bunsen tube.

The patentees remark in conclusion that they are aware that it has heretofore been proposed to provide in addition to a gas inlet of fixed bore, a further gas inlet of adjustable area; but the essential feature of their invention is that the supplementary gas supply is so diffused or introduced into the burner that it exerts no injective action on the air inlet or inlets to the burner, and therefore the rate of air inflow is not materially varied by the supplementary gas supply.

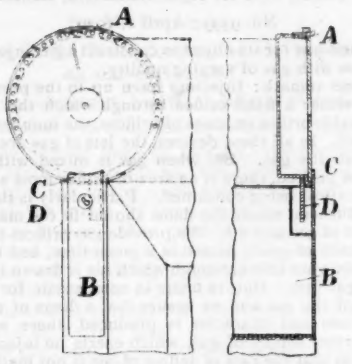
Coin-Freed Gas Meters.—No. 167,377.

GLOVER, W. R., and WHIMSTER, J. I., of Edmonton.

No. 21,560; July 17, 1920.

This invention relates to coin-freed gas-meters in which a price-changer plate or disc is employed as in Patent No. 25,272 of 1894; and the present invention consists in improved means for locking the

changer plate (after having been positioned) in such a manner that it cannot be removed or interfered with surreptitiously.



Glover and Whimster's Coin-Freed Meter.

A front elevation is shown of a corner of a meter, the changer plate, and the money-box; also a section of the price changer, casing, and money box.

On the usual hook A the price changer is positioned, and underneath is the casing to receive the usual money box B, provided with an extension C, which, when it is in proper position and locked, will engage the price-changer plate and with the hook hold it firmly in position—the hook and the money box being preferably at opposite sides of the price-changer plate.

The extension C on the money box is preferably somewhat wide, so as to have a board bearing on the price-changer plate; and the lock or key of the money box is so constructed that the key cannot be removed from the lock except when the bolt D of the lock is shot to lock the money box.

Dry Gas-Meters.—No. 167,424.

SMITH, E. W., of Kennington Park Road, S.E., GASKIN, R. W. E., of New Malden, and SMITH METERS, Ltd., of Kennington.

No. 30,129; Oct. 25, 1920.

This invention relating to dry gas-meters is particularly designed to reduce the prime cost and facilitate adjustment and repair.

Hitherto it has been usual, the patentees point out, to make the vertical part of the body or case of meters from four separate plates soldered together at their edges and attached to top and bottom plates, and partly to enclose the valves and their gear in a built-up case as well as to make a part cover in the same manner for the crank-gear above the valve-plate—a construction that involves considerable work and time. Instead of this they make the back and front panels and sides in two stampings by extending all four vertical edges of the panels at right angles, so as to form the usual meter sides. The central division plate is mounted and soldered between the valve plate and the bottom, and has stamped or beaded portions on its vertical edges—the object being to keep it rigid while the diaphragms are being fitted and to facilitate soldering the sides of the panels.

The usual top plate is used and the valves and their gear above it are framed round by one stamping soldered on the top.

The covering for the crank-gear above the valve plate is made in one stamping and secured by wires, tubes, seal-rings, and seals, so that the meter can be adjusted without having to unsolder any seams.

The diaphragms can be lubricated when the meter is returned for repair, by cutting a hole in the back and front panels, inserting a cranked handle-brush, and smearing the leather over with the lubricant—a tin disc being then soldered over the hole.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Aug. 31.]

Nos. 22,172 to 22,809.

AIRD, K.—"Gas-fires." No. 22,690.
BARROW, P E.—"Geyser." No. 22,809.
BERRY, H. H.—"Electric and gas fires." No. 22,722.
CLARKE, C. H.—"Photometers, &c." No. 22,522.
COFF, J. W.—"Gas-burners." No. 22,267.
GARDNER, J.—"Gas-stoves, gas-rings, &c." No. 22,411.
HANSFORD, J. B.—"Manufacture of neutral sulphate of ammonia." No. 22,645.
HARRISON, A. W.—"Incandescent mantle for upright burners." No. 22,533.
HAWKES, C. A.—"Towers for cooling gases, &c." No. 22,592.
HEALY, J.—"Device for indicating the quality of gas generated in suction-gas plants." No. 22,673.
HILL, J.—See Healy. No. 22,673.
RIGBY, T.—"Lighting burners." No. 22,259
TRESIDDER, S. L.—See Rigby. No. 22,259.
VINCENT, G. T. & W. P.—See Barrow. No. 22 809.
WALLACE, D.—"Desulphurizing gases." No. 22,678.
WAYNE, P. F. W. PICTOR.—See Barrow. No. 22,809.
WORTLEY, G. W.—See Aird. No. 22,690.

The Burgh of Irvine have decided to instal the "A. & M." [Alder and Mackay] patent pressure-wave automatic controllers, to the extent of 120 lamps.

MISCELLANEOUS NEWS.

SPONTANEOUS COMBUSTION OF COAL IN MINES.

Evidence before the Departmental Committee.

Following upon the evidence given by Dr. R. V. Wheeler before the Committee appointed some years ago to inquire into the circumstances in which spontaneous combustion of coal occurs in mines, and the means of preventing it [*ante*, p. 494], Dr. Marie Stopes and Mr. F. S. Sinnatt dealt further with the same aspect of the question at a meeting of the Committee which took place in April of last year. The Chairman of the Committee was Sir Richard Redmayne, K.C.B.

DR. MARIE CARMICHAEL STOPES.

It was explained by witness that she had been round the world investigating coal mines, and had paid particular attention to the structure of coal, and the plants which composed it. In the coal substance there were structures with essentially different characters—characters not only different in their origin (different plants, and different parts of the plants), but which had been so treated by various bacterial and physical processes working to produce coal, that their physical, chemical, and optical properties differed from each other. Therefore, when one had these substances mixed together, looking as if they were a uniform substance, and they were treated as such, one was bound to get a result which did not tally with the true structure being dealt with. An inquiry into the manner of the spontaneous combustion of coal demanded a knowledge of the nature of the chemical reactions that took place between atmospheric oxygen and all portions of the coal substance. This, in turn, demanded more knowledge of the constitution of coal than had hitherto been applied to the subject. Little was to be gained, for example, by the most exact determinations of the "rate of oxidation" of some particular sample of coal, unless it was known what portion of the coal substance—a highly composite conglomerate—was attacked. Apart from the fact that varied conditions existed in coal mines which affected, to a greater or less extent, the actual incidence of a fire or dangerous heating, it was clear that differences in the physical and chemical properties of parts of the coal substance might render it more or less liable to attack by oxygen, and consequently more or less liable to self-heat rapidly. Among practical miners the opinion was prevalent that when spontaneous combustion occurred in the solid coal, the heating often followed a course which indicated that there was a differentiation of some band or bands in the coal seam, which either originated or preferentially transmitted the heating. In saying "band or bands," she did not necessarily mean only the horizontal or rectangular portions. The bands were lenticular, and therefore they tended to interlock.

The CHAIRMAN: Nearly all coal in this country is subject to vertical cleavage. That is where the fire originates mostly. These breaks, due to pressure of the roof, and so on, are liable to be filled with finely powdered coal, which allows of very rapid oxidation, because there is such a vast area exposed; and that is where we mostly find the fire originates.

Witness replied that she did not think this at all conflicted with what she had said. Of the substances existing in coal, there was in this connection one upon which she laid considerable stress. This was fusain, which was a fine fibre-of-wood tissue, extremely friable and ready to be pulverized. It lay in lenticular layers in the coal; and when there was a cracking it tended to powder. Therefore it would accumulate in, or be driven towards, any naturally-forming crack. Fusain had been adopted as being a better word than "mother-of-coal," which conveyed the wrong idea that it was the source from which the coal originated. She did not see why fusain should not have several different sources of origin, just as solid mass coal had; but, so far as she had examined it, the portions which showed structure were always timber fibres. There was, however, much rather amorphous material among it, which one could not identify at all. This might have taken its rise from bark; but she could not be sure about it. Even on ordinary examination of coal, there could be noticed in it, not only the roughly separated dull and bright portions, but four quite distinct and separate zones. These four portions—fusain, vitrain, durain, and clarain—she had studied in detail; and samples were produced for the Committee to inspect, and their characteristics explained. While all coal of high oxygen content should be regarded as suspect (until it had been proved to have a clean bill of health), the effect of the physical differences which rendered certain portions more liable to pulverize, others more liable to contain occluded gases, and others to have a higher water-content, &c., must also be taken into consideration. Dr. Wheeler and witness had not yet finished their work upon the influence of fusain; but the four ingredients named were in close juxtaposition in the same block of coal, and they thought their distribution in relation to each other would have a distinct influence on the liability to combustion. At the stage which their research had then reached, they thought the point of junction between fusain and vitrain was likely to be a very critical spot. The relation of these two, and the effect on each other of their junction under certain conditions, was a subject which was likely to yield useful research. The physical condition of the coal had undoubtedly a very important bearing on the whole question, apart from the prevalence in it of vitrain, fusain, and so forth. Every factor must be taken in conjunction. Further investigation was absolutely necessary, and most urgent. Until several years more of actual detailed work—scientific research—had been done in following out the differences of the kind she had pointed out in the various coal seams, witness would hesitate very much to lay down any general rule. At present Dr. Wheeler and she were only laying the foundation of their work. They had a clue, and were to some extent following it up. Really the main point of her evidence was that observations should be made as to the four ingredients that had been named. In her opinion, their existence largely invalidated researches on coal treated in bulk as if it were uniform.

MR. FRANK S. SINNATT, M.B.E., M.Sc., F.I.C.

It was explained by witness that he had been engaged in this research work at the Manchester College of Technology, for the Lan-

cashire and Cheshire Coal Research Association. Eight of the largest collieries in Lancashire had combined for the purpose. The particular point he had been studying throughout had been the substance fusain; and the main reason why he had commenced to study it—he was doing so before he knew its present name—was that a considerable number of fires had taken place in the dust on the surface at a particular colliery. One part of the examination of a mine dust should consist of the determination of fusain present. Because the property of fusain was such as to make dust. The dust in a pit might contain 30 p.ct. fusain, whereas the coal itself might contain only 1 p.ct. If a heap of fusain, or a briquette made of it, were lighted at one corner, the whole mass of it would burn away. A determination had been made of the mixtures of coal dust and fusain which would burn; and fires had been obtained in mixtures containing 30 p.ct. of fusain and the remainder coal. In the course of this heating, the temperature attained was about 500° C. It was practically invisible combustion; and whether or not there was any coal dust present, it was almost odourless. There was just a faint smell, somewhat resembling that of pitch-pine.

Mr. J. H. W. LAVERICK (a member of the Committee): Occasionally we have had fires in colliery screening plants. Is it possible that they have been due to that?

Witness said he should put them down largely to the fusain. In addition, the extreme difficulty experienced in extinguishing the fires was well recognized, because fusain was hard to wet. The next point was with regard to the absorptive properties of fusain. In some tests with a salt solution, it was found that the solution flowed into the fusain, whereas it had not entered the coal, except superficially. That was to say, fusain had the power of absorbing liquids, and probably gases also. Therefore it might act as a channel for both liquids and gases. Thus it was likely that it absorbed oxygen more quickly than did any other portion of the seam; and this would render it more liable to be the seat of spontaneous combustion. Experiments with a certain coal ground to two degrees of fineness showed that the finer glowed spontaneously at 219° C., and the coarser at 396° C.; while a mixture of two parts of the finer material and one part of the coarser glowed at a temperature of 250° C.—*i.e.*, at a much lower temperature than the coarse material alone. Having referred to the composition of fusain occurring in the Ravine mine (one of the seams most subject to gob-fires in Lancashire), witness said he took an opportunity of examining this mine after a rather bad fire had occurred, in which the roof had fallen away. In this instance, it was actually above the seam. About 400 tons had fallen out, and left the seam torn away; and he examined it particularly to see whether the fusain band had been injured. He found the seam was in parts quite open where the fusain band should occur. In other words, this particular band had come from the seam, in spite of the fact that the seam was still there, to the extent that one could put one's hand into the partition where the fusain band had originally existed. It was all burned away. He did not argue from this that the fire originated there, but merely suggested that it might have travelled down the fusain. Other experiments showed that the nitrogen products in the coal might be those most liable to preliminary oxidation. Another line of work went to indicate that coal-dust explosions would be less liable to take place in an atmospheric state of fog than at other times. When the humidity in the air went up, so did the moisture in the coal. Coal dusts were more prone to absorb moisture, and very rapidly. This rapid absorption and expulsion of moisture might have a considerable influence upon the rate at which coal would oxidize.

Mr. RIGBY: Would it oxidize more rapidly the higher the moisture?

Witness: The more rapidly it might change in moisture content; not the higher the moisture.

The CHAIRMAN: Inasmuch as the absorbent capacity of coal dust is more rapid in point of moisture when moisture is present in the air to a considerable extent, you say its absorbent power is equally great in respect of oxygen?

Witness: It might have properties which tend towards that. Continuing, he said it would appear that the oxidation of iron pyrites was not a simple reaction, but led to the formation of complicated compounds which were no doubt present on the surface of the coal, and might have a secondary or primary influence upon the oxidation of the coal. He was going to carry on this work. Fusain was a subject which the Lancashire and Cheshire Coal Research Association would continue to investigate.

Mr. LAVERICK: May the low ignition-point of fusain be the cause of fires, both on the surface and underground?

Witness: Yes, I think it may be a contributory factor.

GAS REGULATION ACT APPLICATIONS.

The following further notices have appeared in the "London Gazette" of applications by gas undertakings to the Board of Trade for Orders under section 1 of the Gas Regulation Act.

Aberdare and Aberaman Consumers' Gas Company.

The maximum price now authorized in respect of the supply of gas by the undertakers is 6s. 6d. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 2s. per therm.

Chester-le-Street Gas Company, Ltd.

The standard price now authorized in respect of the supply of gas by the undertakers is 2s. 9d. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 4·4d. per therm.

Macclesfield Corporation.

The maximum price now authorized in respect of the supply of gas by the undertakers is 4s. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 8d. per therm.

Newport (Isle of Wight) Gas Company.

The standard price now authorized in respect of the supply of gas by the undertakers is 4s. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 7·83d. per therm.

Tynemouth Gas Company.

The maximum prices now authorized in respect of the supply of gas by the undertakers are 3s. per 1000 c.ft. within the county borough of Tynemouth and the urban district of Whitley and Monkseaton, 3s. 6d. in the urban district of Earsdon, and 4s. in the urban district of Seaton Delaval; and the maximum prices which they have asked the Board of Trade to substitute for these are 1s. 5·2d., 1s. 6·4d., and 1s. 7·6d. per therm respectively.

Wellington (Somerset) Gas Company.

The standard price now authorized in respect of the supply of gas by the undertakers is 4s. 3d. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 6d. per therm.

DECLARATIONS OF CALORIFIC POWER.

British Gas Light Company, Ltd. (Staffordshire Potteries).—470 B.Th.U. (Sept. 1.)

Cambridge University and Town Gas Light Company.—475 B.Th.U. (Sept. 10.)

Salisbury Gas Company.—450 B.Th.U. (Sept. 1.)

Solihull Gas Company.—475 B.Th.U. (Sept. 19.)

GAS REGULATION ACT ORDERS.

The Director of Gas Administration has forwarded copies of the following further Orders made by the Board of Trade under section 1 of the Gas Regulation Act.

Omagh Urban District Council.

As from the declared date, the maximum price in respect of gas supplied by the undertakers shall be 1s. 8d. per therm. (Sept. 1.)

Richmond Gas Company.

After the declared date: (1) The standard price in respect of gas supplied by the undertakers shall be 15·4d. per therm; and (2) 14·8d. per therm shall be substituted for 3s. per 1000 c.ft. in section 34 (dividend dependent on price) of the Richmond Gas Act, 1901.

For the purpose of ascertaining the authorized rate of dividend for the half year in which the declared date occurs, the price charged per 1000 c.ft. during that part of the half year (if any) before the declared date shall be rendered into the equivalent price per therm by dividing it by four-and-four-fifths.

After the declared date, "therm" shall be substituted for 1000 c.ft. in section 40 (price of gas to public lamps) of the Richmond Gas Act, 1901. (Sept. 2.)

Wisbech Lighting Company.

After the declared date, the standard price in respect of gas supplied by the undertakers shall be 18·8d. per therm.

For the purpose of ascertaining the authorized rate of dividend for the year in which the declared date occurs, the price charged per 1000 c.ft. during that part of the year (if any) before the declared date shall be rendered into the equivalent price per therm by dividing it by five. (Aug. 30.)

BOURNEMOUTH GAS AND WATER COMPANY.

Annual Co-Partnership Meeting.

At the Annual Meeting of the Bournemouth Gas and Water Company's co-partners—presided over by Mr. WILLIAM CASH, the Chairman of the Board of Directors—the accounts presented for the year to June 30 showed that the bonus transferred to the 426 members of the scheme amounted to £3209—an increase of £800 over the amount for the previous year. The total amount of bonus distributed during the 13 years the scheme has been in existence was £30,633. The savings deposited by the members during the year amounted to £1074; the total since the commencement of the scheme being £6339. The total amount invested in the "B" shares of the Company through the scheme is £20,234; and the balance held by the Trustees on behalf of the co-partners is £5051. The amount added to the pensions fund for the year amounted to £5960; and the balance in the fund at June 30 was £13,987. The increase in the number of co-partners during the year was 38; the average amount of bonus paid per member being £7 15s., as compared with £6 2s. last year.

The CHAIRMAN pointed out that it was impossible, under present conditions, to go back to the original basis of a sliding-scale for calculating the bonus, dependent upon the price of gas. The bonus had been maintained at a minimum of 4 p.ct., and as soon as the Company obtained permission to revise their charges for gas, it was hoped that it might be possible to reconsider the basis upon which the bonus was calculated. In February, the Company made application, under the Gas Regulation Act, for powers to make their charges upon a thermal basis; but so many undertakings were making similar applications, that an Order had not yet been granted. In due course the Order would be granted; and it would then be possible to fix a fresh basis for the bonus payable under the co-partnership scheme. The introduction of the Order would mark the beginning of a new period of progress, as it would enable them to reap the full advantage of all the savings effected in the manufacture and distribution of gas, so that co-partners, shareholders, and consumers would alike benefit. Mr. Cash went on to speak of the trade depression from which the country was suffering, and pointed out that the first great necessity was economy. Unfortunately, more was required than simply cutting-down expenditure, as, unless the men displaced could be absorbed into other occupations, the result would simply be to increase the already huge army of unemployed. Fresh openings were needed, and new developments must start in industry if national waste was to be prevented; and the only way in which such a revival could take place was by

close co-operation between all the parties concerned. There were, however, distinct signs of improvement in the outlook. The prices of materials were beginning to fall gradually, a reasonable attitude was being taken up on the wages question, and reductions had been amicably agreed upon; and with the reduction in manufacturing costs expansion would quickly come. In conclusion Mr. Cash showed how the principles which governed the gas industry—the safeguarding of the interest of the shareholder, worker, and consumer—if followed out whole-heartedly, would lead to the speedy restoration of national welfare and prosperity. There must be mutual understanding, goodwill, and co-operation between all parties to the contract, and then a true and stable balance of interests would be established. The aim that co-partners ought always to keep in view was to produce the most satisfactory article at the lowest possible price. By doing this they would be doing their bit to help the neighbourhood in which they lived to recover from the present depression. The war had given a wonderful example of the possibility of all working together, not for individual gain, but for the national good. The same spirit which had led to victory would overcome the difficulties of reconstruction. Let each realize for himself, and hold up to others the aim of willing service for the common weal.

BARNET DISTRICT GAS AND WATER COMPANY.

Financial Effects of the Coal Strike and Drought—Both Gas and Water Supplies Maintained Unrestricted.

The Ordinary Half-Yearly Meeting of the Company was held on Monday last week, at the London Offices, No. 139, Cannon Street—Mr. ARTHUR F. PHILLIPS in the chair.

The SECRETARY (Mr. E. D. Davey) read the notice calling the meeting; and the Directors' report and the accounts were taken as read.

The CHAIRMAN, in moving their adoption, said the past half year had been one of anxiety to the Directors by reason of the difficulties in the supply of coal, and the strike of the coal miners. The Company accumulated what was considered a sufficient stock of coal—not contemplating a strike and stoppage of supplies for three months. As a consequence, imported coal had to be purchased at more than 100 p.ct. above pre-strike prices. Coke at greatly enhanced prices had also to be purchased for the water-works. Owing to the considerably increased cost of coal and other expenses, the half year showed not a small reduction in the profit from both the gas and water undertakings; the causes being quite beyond the Company's control. The working had been as efficient as ever it was. There was a slight increase in the gas sold of 1·09 p.ct., which might be considered satisfactory, because, while the supply was being fully maintained, consumers were requested to reduce their consumption as much as possible. There was no addition to the capital expenditure on the gas undertaking; but there was a credit of £293 for depreciation. In the gas revenue account, gas realized £31,594, against £27,652 in the corresponding half year; the price being only 3d. per 1000 c.ft. more in one part of the district. Bye-products had realized £8051, against £9357; 798 tons less coal having been carbonized, and replaced by 39,675 gallons of oil to increase the production of carburetted water gas. There was also a reduction of £793 in the receipts from sulphate of ammonia—a loss of revenue which appeared likely to continue. Coal, oil, and coke for producing the gas cost £21,192, as compared with £13,573. Wages amounted to £3429, against £3120. Repairs of works required £6181, as contrasted with £5841. The total expenditure was £39,200, compared with £31,031. The balance carried to profit and loss was £4410, against £9601—the reduction being mainly due to the coal strike, the increase in the cost of imported coal, its inferior quality, and the larger proportion of water gas, which resulted in the diminution of the receipts for coke. The balance to be carried to profit and loss was £7923, as contrasted with £11,253—a reduction of £3330 compared with the corresponding half year. The balance of revenue from the gas and water undertakings to be added to profit and loss was £12,333, against £20,854 in the June half of last year—a reduction of £8521. As it required £17,284 to meet the charges for income-tax, interest on debentures, and to pay the proposed dividend, they had to draw on profit and loss (less £231 interest received on deposits)—leaving a balance of £23,412 to carry forward to the next half year, against £28,130 brought in from December last. The balance was still a satisfactory one. The proprietors might be anxious to know how the loss of £4718 was to be avoided in future. The estimated extra cost of coal due to the strike was £1231 for the water-works, and £5482 for the gas-works—together £6713. It was expected this half year to obtain a considerable reduction on this item. The price of oil had been greatly reduced; and there would be a reduction in wages. It was, however, necessary, when calculating on these economies, to realize that there would be a reduction in the receipts from bye-products, especially sulphate of ammonia, tar, and probably coke. The Company fortunately had not had to reduce the dividend that was being paid before the war; and until last half year the profit generally slightly exceeded the amount required, and additions were made to the contingency fund. No application was made by the Company under the Temporary Increase of Charges Act, because this would have reduced the dividend 25 p.ct. It was now, however, proposed to make an application under the Gas Regulation Act, by which it was expected to be assured of the pre-war dividend for the gas undertaking; and it was hoped that the legislation now under consideration would allow an increase in the water charges to enable the pre-war profit to be maintained. It was not reasonable that the Company, with the great increase in the cost of fuel, wages, and all materials required, could continue to supply water without any increase in the charges. The Company had successfully endeavoured to keep down expenses, and to continue the supply of water without increasing the rates during the period of the war, and since its termination. The plants of both the water and gas works had been well maintained, and were capable of meeting all demands likely to be made upon them. There was no capital expenditure contemplated beyond completing the pumping-station at North Mimms.

The DEPUTY-CHAIRMAN (Dr. J. W. L. Glaisher, F.R.S.) seconded the motion, which was unanimously adopted.

Proposed by the CHAIRMAN, and seconded by Mr. COLIN DOCWRA, dividends were declared for the half year at the rate (less income-tax) of 9 p.ct. per annum on the "A" and "C" stocks, 8 p.ct. per annum on the "B" stock, and £6 6s. p.ct. per annum on the "D" capital gas and water stocks.

Mr. MACKWORTH WOOD said he thought the attendance at the meeting and the absence of any criticism showed that the proprietors were entirely satisfied with what the Directors had done on their behalf. During the past half year, they had had a most strenuous and severe time, owing to the abnormal conditions imposed by the coal strike; and now Nature had somewhat saddened the outlook of a great number of water engineers by an unprecedented drought. The conditions in Hertfordshire were extraordinary; and the Company had no cause for great anxiety. But these things did not trouble the proprietors much, so long as they were getting the dividend which the Directors had been good enough to maintain for them ever since the outbreak of war. Personally, he was satisfied with the year's trading. The staff, particularly the engineering section, had also had a strenuous and worrying time. The proprietors were grateful to them, as well as to the Directors for their assiduous care and attention.

Mr. F. R. SMITH, in seconding the motion, remarked that the profit had only been decreased through circumstances over which the Directors had no control; but they had managed to keep up the business by good management, which had enabled them to maintain a good carry-forward, and to pay the same dividend. The thanks of the proprietors were due to the Directors, and to Mr. Bancroft (their Engineer) and Mr. Davey, for a successful balance-sheet.

The motion was heartily agreed to.

The CHAIRMAN thanked the proprietors for their confidence and acknowledgment of their services. The last half year had been an anxious one; and the Directors could fully endorse all that had been said regarding their officers and staffs.

Mr. F. J. BANCROFT, responding on behalf of the officers and staff, said he could assure the proprietors that the half year had been hard and strenuous; but he was pleased to say they had been able to maintain both the gas and water services unrestricted throughout the whole of the strike and the unprecedented drought. This had given gratification to the consumers; and it had been a pleasure to him to meet all the demands.

SHREWSBURY GAS COMPANY.

The Annual Meeting of the Company was held at the Offices on Thursday last—Mr. J. B. LLOYD (the Chairman) presiding.

The report of the Directors stated that the profit on the year's working amounted to £4024. They recommended a dividend of 3 p.ct. (less tax) for the year. There had, they said, been a decrease of 1½ million c.ft. in the sale of gas during the year, which was very satisfactory, considering the restricted sale during the period of the coal strike. A continuous supply of gas was maintained, in spite of the great difficulties entailed. Extensive renewals of carbonizing plant had been completed, the cost of which would be spread over a period of four years.

The CHAIRMAN, in moving the adoption of the report, said the excessive charges for coal during the strike period brought the average cost for the year up to 55s. per ton. There was an increase of over £2000 in the cost of repairs and maintenance of mains, services, and meters, due partly to the after-effects of war conditions. Altogether the revenue expenditure had increased by £8194, and the receipts by £6416; the gross profit being £1778 less than last year. The net profit amounted to £4118, out of which they proposed to pay a dividend of 3 p.ct., which would leave a balance of £1321 to carry forward.

Mr. C. W. S. DIXON complimented the staff on their work during the coal stoppage. He trusted the Directors would take a long view of the position and prospects of the Company before considering any addition to the price of gas. The Company had a lot of leeway to make up. In the past three years they had paid out about twice as much in rates and taxes alone as they had been able to pay the shareholders in dividend; and Shrewsbury ratepayers should consider the relief contributed by the Company to the rates, when they felt inclined to criticize the price charged for the gas. He had the utmost confidence that the Company, with careful guidance and well-directed enterprise, had a most useful and prosperous future awaiting it.

The report and statement of accounts were adopted.

On behalf of the shareholders, thanks were given to the Chairman, the Directors, the Secretary and Manager (Mr. C. M. D. Belton), and the staff and workmen.

Sir John Cass Technical Institute.—The new session of the Institute (which is in Jewry Street, Aldgate, E.C.) will commence on Monday, Sept. 26. Students will be enrolled during the week commencing Monday, Sept. 19, between 7 and 9 p.m. The courses of instruction at the Institute are specially directed to the technical training of those engaged in the chemical, metallurgical, and electrical industries, and in trades associated therewith. Full facilities are provided in the well-equipped laboratories for special investigations and research. The instruction in experimental science also provides systematic courses for the examinations of the London University and the Institutes of Physics and Chemistry. Special courses of higher technological instruction form a distinctive feature of the work of the Institute. For the forthcoming session these include courses on metallography and pyrometry, and heat treatment and mechanical testing of metals and alloys. An important development for the new session is the establishment of courses of instruction in petroleum technology. These have been designed to meet the needs of those engaged in, or associated with, the practical and scientific control of the petroleum industry.

TRADE NOTES.

[For "Journal" Advertisers.]

Sadler-Cockey Reversible Valves.

Without entailing any extra cost, either in working or in initial expenditure, Messrs. Edward Cockey and Sons, Ltd., of Frome, are able to offer a centre-valve which not only retains the existing method of forward rotative working, but in addition the reverse or backward process of rotative working can be obtained. It is the Sadler-Cockey patent reversible centre-valve. At present eleven of these valves (20 in.) are being fitted to the order of the Glasgow Corporation Gas Department; while others recently supplied have been for the Bristol, Newport (Mon.), and Widnes Gas-Works. An illustrated pamphlet issued by the firm gives diagrams showing purifier arrangements with ordinary type of centre and side valves, and the limited number of changes that can be made with them; while other diagrams show similar arrangements with the Sadler-Cockey valve, and make a comparison of the large number of changes that can be made. Taking, for example, a set of four purifiers with a total of sixteen upward and forward rotative changes under present arrangements, with the Sadler-Cockey valve, permitting the gas to flow also in a downward and backward direction, twice as many (or thirty-two) distinct changes can be obtained. The life of the box is in this way prolonged, and the oxide can be systematically worked-up until fully charged with free sulphur. Other advantages claimed for the use of the Sadler-Cockey valve are that the risk of back-pressure resulting from constantly working in the one direction can be immediately removed by reversing and working in the opposite direction; less frequent changing and revivifying of the oxide considerably reduces the amount of gas loss, and also results in a reduction of the labour costs attending same. In no instance does the foul gas come into contact with the valve-seats, so that there is no possibility of leakage through deposit on the valves and faces, and no possible risk of corrosion. The gas can be completely shut-off, if desired, while the changes are being brought about; and the valve can be constructed to operate two, three, four, five, or six purifiers.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Sept.* 5.

The London tar products market continues without any material change. There is a fair amount of inquiry for pitch; but buyers and sellers do not, at present, appear to be able to reconcile their ideas of values. Tar for road work still continues in fair demand; and this will, of course, further reduce the quantities of pitch available. Creosote is scarce, and for what supplies are available from 9d. to 9½d. per gallon can be obtained. Pure benzole and pure toluole are in demand at from 3s. 3d. to 3s. 6d. per gallon.

Solvent naphtha 95-160 is steady at 3s. per gallon.

Tar Products in the Provinces.

Sept. 5.

The average values for gas-works products during last week were: Gas-works coal tar, 61s. to 65s. Pitch, East Coast, 80s. to 82s. 6d.; West Coast—Manchester, 77s. 6d. to 80s.; Liverpool, 77s. 6d. to 80s.; Clyde, 77s. 6d. to 80s. Benzole 90 p.ct. North, 2s. 4d. to 2s. 6d.; crude 65 p.ct. at 120° C., 1s. 11d. to 2s. naked at makers' works; 50-90 p.ct., naked, North, 2s. 3d. to 2s. 4d. Toluole, naked, North, 3s. to 3s. 1½d. nominal. Coal tar crude naphtha in bulk, North, 11d. to 11½d. Solvent naphtha, naked, North, 2s. 8d. to 2s. 9d. Heavy naphtha, North, 2s. 7d. to 2s. 9d. Creosote, in bulk, North, liquid, 9d. to 9½d.; salty, 8½d. to 8¾d. Heavy oils, in bulk, North, 10½d. to 11½d. Carbolic acid, 60 p.ct., 1s. 6d. Naphthalene, £20 to £30; salts, £7 to £9, bags included. Anthracene, "A" quality, 8d. to 10d. per minimum 40 p.ct.; "B" quality, nominal.

FROM A MARKET CORRESPONDENT.

By-Products Trade.

A slow recovery is to be noted in the coke industry; and this gives good ground for hoping that the majority of coke-ovens will be working again before the end of this year. Several more blast-furnaces have been restarted, and many others are getting ready; so that the demand for coke is increasing, although normality cannot be expected for some time to come. Nevertheless increased activity in tar distilling may be looked for, although, for the present, the demand for products is comparatively small. A much larger export in briquettes is being shown in South Wales, with a consequent increasing demand for pitch. At the present, pitch prices range from 80s. to 90s. per ton; but, apart from South Wales, buyers are only inclined to cover their immediate requirements, and at the same time sellers are not anxious to commit themselves very far forward. There is a slight increase in the quantity of solvent naphtha available; but as the demand remains good, prices are maintained at about 3s. per gallon. Naphthalenes are quiet and unchanged at £7 to £11 per ton for crudes, and £18 to £22 per ton for refined. Creosote is a firm market at 9d. per gallon. There is nothing doing in carbolic acid, and cresylic acid is inactive, with pale 97/99 p.ct. at 2s. 2d., and dark 95/97 p.ct. at 1s. 11d. per gallon. Makers are endeavouring to secure slightly better prices than those quoted, but do not secure much business at the advance. Pure benzole is practically unobtainable; but the demand is not very great, and the price remains steady. Ninety per cent. is scarce, and prompt deliveries are firm at 3s. per gallon in London and 2s. 10d. to 2s. 11d. in the Provinces. Consumers apparently are glad to get any quantities at these prices, in spite of the fact that they can buy petrol for motoring purposes at 2s. 5d.; but they are gradually coming to realize that a gallon of benzole does more work than a similar quantity of petrol. In intermediate products there is little fresh. The demands remain quiet; stocks of several products are very small. There is a better inquiry for aniline oil and salts at 1s. 6d. and 1s. 7d. per lb. respectively. Technical resorcin is 4s. 6d. per lb.; pure, 8s. Anthracene, 40 to 50 p.ct. is 9d. per unit; and salicylic acid 1s. 2d. per lb. technical grade. Beta-naphthol is featureless at 2s. 9d. per lb.

Sulphate of Ammonia.

The demand both for early shipment and for shipment during the first few months of next year is improving, and export prices have an upward tendency. The home trade is comparatively dull; but there is no getting away from the fact that higher prices for home use are to be expected after the turn of the year, and those who buy to place in store until the agricultural demand comes along in earnest look like having nothing to regret.

Price of Birmingham Gas.

The Birmingham Gas Department have received permission of the Board of Trade for the maximum price of gas to be increased to 6s. per 1000 c.ft. The City Council, at their last meeting, authorized an advance in the price by 8d. per 1000 c.ft. (from 4s. 10d. to 5s. 6d., less 5 p.ct. for prompt payment); but Alderman Lloyd, the Chairman of the Gas Committee, promised that the increase should not be made if it could possibly be avoided—that is, if production costs declined. There is as yet no improvement, however, in this respect. It is officially stated that the increase on railway rates alone borne by the Gas Department, compared with a year or two ago, is equivalent to 6d. per 1000 c.ft. on the price of gas. Moreover, the department have closed the coke-ovens for the manufacture of blast-furnace coke, as they are unable to compete with coke manufacturers whose works are situated close to the coalfields. The weekly gas consumption is 50 million c.ft. less than it was in Birmingham at the corresponding period of last year. This is due, of course, in the main to the industrial depression. A very large number of Corporation and other gas-fitters are only partially employed, owing to the lack of developments at works. The increase of 8d. will probably commence as from the September meter readings.

Sale of the Banff Gas-Works.—The Directors of the Banff Gas Company have entered into an arrangement with Mr. Alexander Yuill, of Dundee, and Mr. J. W. Napier, of Alloa, for the purchase of the works and plant; the price being £5100. An extraordinary meeting of the shareholders of the Company has been called to confirm the agreement.

Taunton Electricity Deficit.—Strong complaints were made at the annual meeting of the Taunton Gas Company, with reference to an increase of 3½d. in the pound on the borough rate, to meet the deficiency on the municipal electricity undertaking. Mr. R. Benford (the Vice-Chairman) declared that it was most unfair competition to have to bolster up one's competitors by paying largely increased rates. Taunton ratepayers were now in for a bad time, as the extension of the borough would involve heavy expenditure.

A Mantle that Ignites Gas Automatically.—The "Dundee Advertiser" says: An incandescent gas-mantle which eliminates the use of matches or other means of ignition, first conceived by a well-known Dunfermline man, who does not wish his name divulged at present, is likely to be placed on the market in a short time. The screw of the gas-jet only requires to be turned; and without the application of a light, the necessary illumination is secured. There are no new mechanical contraptions; the whole secret lies in the texture of the mantle. The mantle, it is understood, will cost 1s. 6d.

Fatality at the Leek Gas-Works.—An inquiry was held on Monday of last week respecting the death of Levi Smith, aged 49, who was working on the roof of a holder at the Leek Gas-Works, when he fell through and was killed. William Dawson, a fitter's labourer, employed by Messrs. R. & J. Dempster, said that he was working with the deceased at the time of the accident. Deceased slipped on a plate, and fell through a hole to the bottom. He had previously told witness that they must lay a big plate over the hole. The Coroner returned a verdict of "Accidental death;" and Mr. E. O. Jones, on behalf of Messrs. Dempster, expressed regret at such an unfortunate occurrence.

Teignmouth Gas-Works Plant.—Major Stewart last week conducted a Ministry of Health inquiry at Teignmouth, into the application of the Urban District Council for sanction to borrow sums of £1040 and £3500 for the provision of an exhauster and condensers and the renewal of gas-mains respectively. Opposition came from Messrs. P. R. Foster (Vice-Chairman of the Council) and R. E. Harris (another member), who were the only ratepayers present. They contended that a second opinion should have been taken on the proposal. They also alleged that a largely-signed petition from gas consumers had been ignored by the Ministry of Health. Mr. A. P. Dell (Solicitor to the Council) pointed out that the condensers and exhausters were old, and that the mains were not only small but holed. In some places there were no mains at all—the gas passing through the clay. The works were built somewhere about the year 1835.

The Strike and a High Therm Make.—During the recent coal strike, the Blyth Gas Company were able to maintain a supply of gas from coal in stock through the magnificent results obtained by the carbonization of second-class Durham coal in a vertical retort plant erected by West's Gas Improvement Company, Ltd., of Manchester, as the following figures will show. Over 110 days, 1608 tons of coal were carbonized, producing 39,385,000 c.ft. of gas of an average calorific value of 425 B.Th.U., being an average of 21,380 c.ft. per ton—and this from coal which had lain in stock in the open for an indefinite period. This average, it is claimed, could easily be a record production from the class of coal used. One test over 70 hours gave an average of 26,729 c.ft. of gas of a calorific value of 410 B.Th.U. Without the above results, the Company would, no doubt, have had to import reparation or other coal at fabulous prices and of inferior quality, in order to "carry on."

Worthing Gas Company.

The disastrous effect of the coal strike upon gas undertakings formed the chief topic of discussion at the half-yearly meeting of the Company over which Mr. William Cash presided. The revenue account showed that coals, including all expenses, had cost £33,756, as against £27,536 in the corresponding half year; and the Chairman said that, in common with many other gas companies, they had had to contend with very inferior coal which had entailed an extra cost of £4000. From the sale of gas they had received £33,402, which was an increase over the corresponding period. This was due to two factors. One was that the gas was 4d. per 1000 c.ft. higher; but, what was to them far more satisfactory, they had sold 8,320,000 c.ft. more than they had in the same half of the previous year. The sale, too, in the current half year had increased, so that it did not look as though the figures he had mentioned were but a temporary gain. The increase was equal to 8 p.ct. of the amount sold in the corresponding half of 1920. In a decrease in wages their expectations with regard to the stoking machinery had been fully realized. Had it not been for the coal strike, they would have had a very satisfactory half year indeed. If the business continued to grow, and they were able to get, as they were getting now, good coal in unrestricted quantities, he saw no reason whatever why they should not have a very satisfactory time, though for some while they would have to bear the burden of the inferior coal they had, and which had cost them about £2 a ton more than British coal did, apart altogether from its poor quality. The report and accounts were adopted, and a dividend at the rate of 3¾ p.ct. was declared.

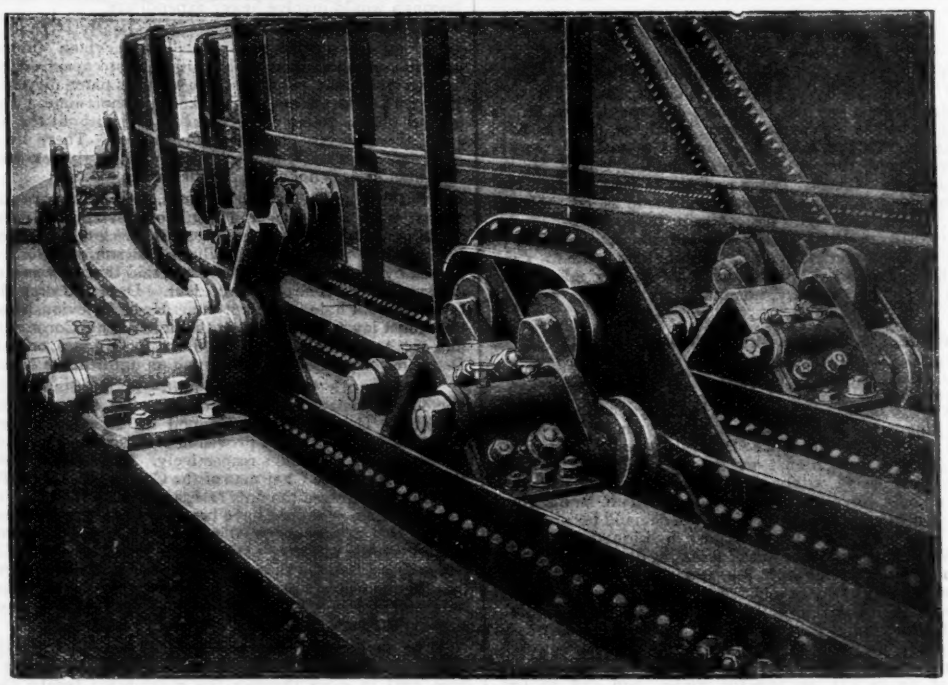
Woking District Gas Company.—At the half-yearly meeting last Monday, the Directors reported that the receipts from sales of gas for the six months ended June 30 showed an increase of 29·42 p.ct. over the corresponding period of 1920, and sales of residual products a decrease of 9·21 p.ct. The revenue was £27,075, and the expenses on revenue account £24,433, leaving a net profit of £2642, to which had to be added the balance brought forward from last account £1710. After making the usual deductions for interest, income-tax, &c., there remained an available balance of £2967, out of which the Directors recommended dividends at the authorized rates of 3⅛ p.ct. per annum on the "A" and "B" ordinary stock and 5 p.ct. on the preference stock, which would leave a balance of £1455 to be carried forward. Application had been made to the Board of Trade under section 1 of the Gas Regulation Act, 1920, to substitute a calorific standard for the pre-existing illuminating power standard, and for power to charge for gas supplied on the basis of therms. The Board of Trade had not as yet, however, made the Order, owing to the number of applications with which they had had to deal. When the Order was obtained, the Directors hoped that the Company would be placed in such a position as would enable them to distribute the same rates of dividend as were paid prior to the war.

Gloucester Gas Company.

The half-yearly meeting of the Company was held last Wednesday, when the Directors submitted a report containing the following remarks: "During the half year ended June 30 gas companies have passed through one of the most anxious times on record. The great coal strike began on April 2 and lasted until July 4. Who would have thought that a gas company could get through thirteen weeks almost without any fresh supply of coal! But during all this time the great demand for gas was fully met in Gloucester; and reduced pressure was only resorted to between the hours of 12 midnight and 6 a.m.—and this out of respect for Government regulations. Few gas companies can show so good a record for the strike period. The water-gas plant helped most materially; and the Directors were thankful that this had been got into working order during the previous December." The report and statement of accounts were adopted, and the maximum dividend of 5 p.ct. per annum upon the consolidated stock was declared. At the close of the meeting, the Chairman and Directors were thanked for their management of the Company's affairs, the resolution adding: "The proprietors wish particularly on this occasion to express their congratulations to the Directors, the Secretary, the Engineer, and the staff and workmen of the Company, for being able to carry on the supply of gas so satisfactorily during the recent coal dispute, when, owing to the almost total lack of fuel in the district, a good supply of gas was essential to the health and well-being of the inhabitants of Gloucester and the neighbourhood."

Bradford Corporation and Coal Prices.—It was announced at a meeting of the Bradford Corporation Gas Committee last Thursday that coal had been bought at 8s. per ton less than the prices operating prior to the miners' strike. The Committee felt that a drop in coal prices was imminent; and it was decided to withhold further purchases at present.

Wirksworth Council and Gas Charges.—Owing to the alleged excessive quotation for gas for public street lighting, the Wirksworth Urban District Council have decided to make a drastic cut in public lighting charges for the coming winter months. It was reported that the Gas Company had asked 8s. 4d. per 1000 c.ft. for gas for street lighting, this being the ordinary rate charged to the smallest consumer. The Surveyor (Mr. H. Hopkins) submitted figures which showed that the town spent £428 on public lighting last year, which it was urged by the Chairman (Mr. Logan) meant a rate of 8d. in the pound. The Chairman further said it was unthinkable that the Company should try to charge more for a public service like street lighting than they did to consumers of power gas. Unless the price was reduced, the Council could not afford to light the same number of lamps as previously; for they were agreed upon effecting some economy, either in price or consumption. Ultimately it was decided to light only 50 p.ct. of the street lamps, and to increase this number if the price of gas is reduced.



THE NEW "BEARSCOT" TWIN GUIDE ROLLERS

R. & J. DEMPSTER, LTD.,

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WESTMINSTER, S.W. 1.

MANCHESTER.

Bodmin Gas Consumers' Company, Ltd.—The Company are this year paying a dividend of 1s. per share, less income-tax, which is half the amount paid twelve months ago. This has been brought about by the coal strike, which necessitated the purchase of foreign coal at greatly enhanced prices.

Irish Gas Companies.—The Alliance and Dublin Consumers' Gas Company announce their dividend at the usual rate of $3\frac{5}{10}$ p.ct. per annum, subject to approval of the Board of Trade; and £5591 is carried forward. The Dundalk Gas Company's dividends are 15s. on the "A" shares and 10s. 6d. per share on the "B" shares—the same as last year.

Oxford Gas Light and Coke Company.—It was reported by the Directors at the annual meeting last Thursday that the Company were the first in the Midlands to obtain an Order under the Gas Regulation Act, 1920, authorizing them to charge for gas by the therm instead of per 1000 c.ft., thereby enabling them to pay pre-war dividends. The standard price per therm is now 15·2d. within the city and 16·4d. outside, instead of 3s. 2d. and 3s. 8d. per 1000 c.ft. respectively. The Directors recommended the payment of a dividend of 5 p.ct. per annum on the preference stock and $7\frac{1}{2}$ p.ct. per annum on the ordinary stock for the half year ended June 30, together with an additional dividend of $3\frac{3}{4}$ p.ct. per annum upon the ordinary stock for the half year ended Dec. 31, 1920, making, with the interim dividend already paid, $7\frac{1}{2}$ p.ct. per annum for the whole year.

Eastbourne Gas Company.—Presiding at the half-yearly meeting of the Company on the 29th ult., Mr. Caleb Diplock said the profit showed a small surplus; and the increase of $3\frac{1}{4}$ p.ct. in the gas sold was satisfactory considering the curtailment owing to the coal strike. The most gratifying point so far as the finances were concerned was that the expenditure had reached high-water mark, and they were looking forward to a reduction in the future. Under the new system of charge, he considered that consumers would find they were getting better value for their money, and a better light which would compare favourably with electricity. He moved that the dividends recommended by the Directors be adopted—viz., £7 7s. 6d. per annum on the "A" stock, £5 17s. 6d. on the "B" stock, and 5 p.ct. on the preference stock. This would absorb £8291, and leave £4896 to carry forward. Mr. A. W. Oke said the Directors were to be congratulated on the higher dividend, on being able to help their competitors with coal during the dispute, and on obtaining such an excellent supply, which enabled them to tide-over the trying time they had passed through. The Directors, Secretary (Mr. J. S. Garrard), Manager (Mr. W. H. Hammond), and staff were thanked for their good services.

Messrs. R. & A. Main, Ltd., will shortly be issuing a complete list of latest pattern gas fires and radiators, including an entirely new series of fires embodying some new ideas. They intimate that an immediate reduction in prices will take place.

The series of booklets of the British Aluminium Company, Ltd., 109, Queen Victoria Street, E.C.—"Hints on Working Aluminium"—prepared primarily for users of their metal, has now reached another edition. These booklets, which deal with aluminium ingots, sheet, circles, tubes, and sections respectively, are of handy size.

At the Halifax Corporation Gas-Works, last Friday, William O'Connor, a local steeplejack, met with a terrible death while working on the top of a chimney. He and other men were removing stones, when O'Connor fell on the platform. This caused a large stone, which was being lifted by a crane, to fall. The platform was smashed, and O'Connor hurled to the ground, 65 ft. below. He was dead when picked up.

Croston householders have been considerably inconvenienced by the deficient gas supply. During the evening service on Sunday, at the Wesleyan Chapel, the gas supply failed altogether, and the service had to be finished in the dark. Improvements being effected at the gas-works are in connection with a scheme to put the system on a better basis; last year's working having, for the first time, showed a loss of over £150.

The "Indian Importer," of which the first issue is just to hand, has been started in order that the Indian retailer may learn what Britain has to offer, and the British manufacturer may ascertain what India is ready to take. At the same time, the British consumer and the Indian producer will also hear of each other through its columns. We are informed that lighting and similar matters will be specially covered in the section devoted to it. The character of this first number holds out good promise for the future.

At the Workers' Union Sports held at Stamford Bridge on Saturday, Aug. 20, the final of the tug of war was won by the team from the Poole Branch of the Workers' Union. This team was composed entirely of employees of the Bournemouth Gas and Water Company, who beat Holloway and Battersea in the first two rounds, and Braintree in the final. The team left Poole at 5.30 a.m. in two taxis, arriving in London at noon. They left London again at 8.30 p.m., arriving at Poole at 4.30 a.m. on Sunday morning—several of the men going on shift within an hour-and-a-half of their arrival home.

The movement known as "Health Week" was instituted in 1912; and in 1914 the Royal Sanitary Institute appointed a committee to undertake the central organization. Local celebrations in each centre are controlled by local committees. This year's "Health Week" is to be held from Oct. 9 to 15. The object of the movement is to focus public attention for one week in the year on matters of health, and to arouse that sense of personal responsibility for health without which all public work, whether by the Government or local authorities, must fall far short of its aims. It is proposed that the dominant idea for 1921 should be "Health, Happiness, and Efficiency," and the consideration of what each individual can do for himself and his neighbour in securing a healthy life.

Main's Surrey Cooker.

A popular Cooker for Housing Schemes. Invaluable where space is restricted. Mounted on adjustable stand.

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THE "N. C." COKE GRATE.

An open fire grate for use with ordinary gas coke. Complies with the recommendations of the Coal Smoke Abatement Committee.

Prices

Interior	£5 0 0
Mantel Register	£6 0 0
Tiled Register	£6 2 6

Full particulars on application.

STOCK MARKET REPORT.

THE Stock Exchange last week was expected to show some improvement in activity, but it did not amount to much. The tone at first was dull—money being firm; but later on, when money became cheap, it improved considerably. As prices rose, however, they were countered by some amount of profit-snatching, so that the final figures were not the best of the week.

In the gilt-edged market, Home Government issues were uneven. Funding gained slightly, Consols and Victory were lower, and War Loan unchanged. Friday's figures were: Consols 47⅞—47¾, War Loan 88½—88 5/16, Funding 71½—71¼, Victory 75½—76⅜. Bonds were in good demand. Home Rails rose and fell; but Canadian and Argentine advanced.

The Foreign Market was variable. French, Chinese, and Mexican were supported; but Brazilian lacked favour.

The Miscellaneous Market had some good points. A welcome feature was the advance of Textiles and Iron and Steel, indicative of an improved trade outlook.

Business in the Gas Market was rather quiet; but the tone was excellent. An almost all-round advance in prices was made, especially in debenture issues. The three London companies led the way. In Suburban and Provincial, Alliance and Dublin, Brentford, British, Croydon, and Ilford rose—some of them largely. In Continentals, Imperial was very quiet and unchanged. European was firm. Primitiva shares were not dealt in; but the quotations were fractionally advanced.

Bargains done for cash during the week were as follows: On Monday, European 7¼, Gas Light ordinary 55½, 56¼, 56½, ditto maximum 43¾, Imperial Continental 127 (and exceptional 112½), Monte Video 55⅜, Primitiva debenture 66, 66¼, South Metropolitan 65½, 65⅝, 65¾, 66¼, ditto 6½ p.ct. debenture £17 paid 19¼-19⅝, ditto fully-paid 99¾-100. On Tuesday, Gas Light ordinary 56½, 56⅝, 56¾, 56¼, 57, 57¼, ditto debenture 51⅞, Imperial Continental 125, 126¼, 127½ (and exceptional 112½), South Metropolitan 66⅛, 66½, ditto 6½ p.ct. debenture £17 paid 19¼-20⅛, ditto fully-paid 100½-100¾, Cardiff debenture 101¼-101⅜. On Wednesday, Bombay 3, European 7⅛, Gas Light ordinary 56¼, 56½, 56⅜, ditto maximum 43½, 43¾, 44¼, 44⅜, Imperial Continental 127 (and exceptional 137½), ditto debenture 79⅜, 80, Monte Video 55, South Metropolitan 66¼, 66½, 67, ditto debenture 49, ditto 6½ p.ct. debenture £17 paid 19¾-20¼, ditto fully-paid 99¾-100¼, Hornsey 4 p.ct. debenture 55. On Thursday, British 23¼, Continental Union 19, Gas Light ordinary 56¼, ditto preference 58¼, 59½, ditto debenture 51, 51½, San Paulo debenture 35½, South Metropolitan 66½, 67½, ditto 6½ p.ct. debenture £17 paid 19¾-20, ditto fully-paid 100⅛-100½. On Friday, European 7½, Gas Light ordinary 57¼, 57½, 58, 58½, ditto maximum 44, 44¾, 45, ditto preference 59, 59½, Imperial Continental 126, ditto debenture 79½, Primitiva debenture 66½, South Metropolitan 67¾, ditto 6½ p.ct. debenture £17 paid 19¾-20¼, ditto fully-paid 100-100⅜.

In the Money Market, a complete surprise was wrought. Contrary to expectation, a plethora of supply was forthcoming, and money went about begging for employment at almost nominal terms. This upset the discount market, and bills were done at very low rates. Silver was very quiet, and the price opened and closed at 38½d. The Bank rate is 5½ p.ct., as fixed on July 12.

A new gas company has been formed at Dunning; and arrangements are being made to restart the gas-works on an early date. The works have been closed-down for some time.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p.c.					
182,049	Stk.	Aug. 26	4	4%	Aldershot 4 p.c. Pref.	...	50—55*	...
1,551,868	,,	Apl. 14	2½	3⅛%	Alliance & Dublin Ord.	59—64	45—48	...
574,000	,,	July 14	4	4%	Do. 4 p.c. Deb.	76—79	46—51	...
280,000	5	Aug. 11	7½	4/-	Bombay, Ltd.	5¼—6¼	3—3½	3
100,000	5	,,	16	4/7½	Bournemouth Gas and Water { 5 p.c.	...	7½—8¼	...
583,110	10	,,	7	7/-	Bournemouth Gas and Water { B 7 p.c.	15—15½	8½—8¾	...
115,000	10	,,	6	6/-	Bournemouth Gas and Water { Pref. 6 p.c.	13½—14	7½—8¼	...
162,065	—	June 30	—	4%	Bournemouth Gas and Water { 4 p.c. Deb.	...	54—59	...
992,045	Stk.	July 15	14	56/-	Brentford A Consolid.	261—266	65—70	...
734,920	,,	,,	11	55/-	Do. B New	204—209	60—65	...
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	68—72	...
221,400	,,	June 15	4	4%	Do. 4 p.c. Deb.	91—93	57—59	...
214,775	,,	Aug. 26	11	10½%	Brighton & Hove Orig.	208—213	110—115*	...
244,200	,,	,,	8	7½%	Do. A Ord. Stk.	134—139	77—82*	...
1,287,500	Stk.	July 28	5	5%	Bristol 5 p.c. max.	...	...	...
530,000	20	Mar. 30	12½	10%	British	44—45	22—24	23½
120,000	Stk.	June 30	4	4%	Do. 4 p.c. Deb. Stk.	88—90	55—56	...
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	50—42	...
100,000	10	May 27	—	6%	Cape Town & Dis., Ltd.	1½—2½	6½—7½	...
100,000	10	Apl. 28	—	4½%	Do. 4½ p.c. Pref.	4—6	4½—5½	...
100,000	Stk.	June 30	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	53—58	...
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	...	...
1,313,280	,,	July 28	5/9/4	42/8	Commercial 4 p.c. Stk.	106—108	53—58	...
560,000	,,	,,	5½	58/4	Do. 3½ p.c. do.	103—105	50—55	...
475,000	,,	June 15	5	5%	Do. 3 p.c. Deb. Stk.	69½—71½	44—47	...
800,000	,,	Dec. 11	4	—	Continental Union Ltd.	76—79	17—22	19
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	113—118	30—40	...
51,600	,,	Aug. 26	15	15%	Croydon A 10 p.c.	...	140—150*	...
278,400	—	,,	12	12%	Croydon B and C 7 p.c.	...	110—120*	...
492,270	Stk.	—	6	4½%	Derby Con. Stk.	125—125	...	...
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	...	...
1,002,180	10	Jan. 29	10	5/0	European, Ltd.	17½—18	7—8	7½—7¾
16,298,975	Stk.	Aug. 11	4/17/4	46/8	Gas Light and Coke { 4 p.c. Ord.	98—102	57—59	55½—58½
2,600,000	,,	,,	3½	35/-	Gas Light and Coke { 3½ p.c. max.	76—79	43—46	43½—45
4,062,235	,,	,,	4	4%	Gas Light and Coke { 4 p.c. Con. Pref.	96—99	58—61	58½—59½
4,674,850	,,	June 15	3	3%	Gas Light and Coke { 3 p.c. Con. Deb.	72½—74½	50—52	51—51½
130,000	,,	Dec. 11	10	10%	Gas Light and Coke { 10 p.c. Bonds.	...	...	...
82,500	,,	Mar. 11	5	3⅛%	Hastings & St. L. 5 p.c.	...	48—53	...
858,740	,,	,,	3½	2⅛%	Do. 3½ p.c.	87—89	34—39	...
70,000	10	May 12	11	5%	Hongkong & China, Ltd.	16½—16¾	5—6	...
86,600	Stk.	Aug. 26	9	9%	Hornsey 7 p.c.	...	75—85*	...
131,000	,,	July 28	7½	7½%	Ilford A and C	151—154	76—81	...
65,780	,,	,,	6½	5⅜%	Do. B	115—118	55—60	...
65,500	,,	June 30	4	4%	Do. 4 p.c. Deb.	92—94	54—56	...
1,976,000	,,	May 27	9	5%	Imperial Continental	130—160	125—130	125—127½
1,235,000	,,	Aug. 11	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	77—82	79½—80
235,242	,,	Mar. 30	6½	3⅛%	Lea Bridge Ord. 5 p.c.	119—121	65—70*	...
2,498,905	,,	Feb. 26	10	57/6	Liverpool 5 p.c. Ord. { A.	211—213	...	...
					Liverpool 5 p.c. Ord. { B.	146—148	...	...
306,083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	...	...	...
165,736	,,	Aug. 11	7/5/6	6%	Maidstone 5 p.c.	...	52—57	...
63,480	,,	Dec. 30	—	3%	Do. 3 p.c. Deb.	...	40—43	...
75,000	5	June 11	6	3%	Malta & Mediterranean	4¼—4½	1¾—2¼	...
250,000	100	Apl. 1	4½	4½%	Met. of Melbourne { 4½ p.c. Deb.	99—101	88—93	...
541,920	Stk.	May 27	4	6%	Monte Video, Ltd.	11½—12	55—60	55—55½
1,875,892	,,	July 28	4½	3%	Newcastle & Gateh'd Con.	98½—99½	57½—58½	...
529,705	,,	June 30	3½	3½%	Do. 3½ p.c. Deb.	82—83	48½—50½	...
15,000	10	Aug. 26	—	7/6	North Middlesex 10 p.c.	...	12½—13½*	...
55,940	10	,,	7/14/0	5/3	,, 7 p.c.	14—15	7½—8*	...
500,000	Stk.	May 12	8	8%	Oriental, Ltd.	117—122	88—93	...
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7¾	2—3	...
188,120	Stk.	June 30	—	3⅛%	Plym'th & Stoneh'se 5 p.c.	...	63—68	...
60,000	50	Aug. 26	13	60/-	Portsea Island, B	128—131	63—68*	...
100,000	50	,,	12	55/-	Do. C	118—121	50—55*	...
249,980	5	April 29	8	—	Primitiva Ord.	5½—6	½—¾	...
499,960	5	June 26	5	—	Do. 5 p.c. Pref.	4½—5	1½—1¾	...
521,600	100	June 1	4	4%	Do. 4 p.c. Deb.	91—93	65—67	66—66½
600,000	Stk.	July 28	4	4%	Do. ,, ,, 1911	...	39—42	...
346,198	,,	June 30	4	4%	River Plate 4 p.c. Deb.	85—87	39—42	...
150,000	10	Mar. 30	6	6/-	San Paulo { 6 p.c. Pref.	10½—11	5½—6½	...
125,000	50	June 30	5	5%	San Paulo { 5 p.c. Deb.	47—49	34—39	35½
135,000	Stk.	Aug. 26	10	5%	Sheffield A	223—224	60—65*	...
209,984	,,	,,	10	5%	Do. B	222—224	60—65*	...
323,500	,,	,,	10	4½%	Do. C	220—222	55—60*	...
133,201	Stk.	Sept. 15	4	4%	Shrewsbury 5 p.c.	...	...	...
90,000	10	June 30	9	8½%	South African	10½—11½	7—9	...
6,609,895	Stk.	July 28	5/4/0	5%	South Met. Ord.	111—113	66½—68½	65½—68
850,000	,,	July 14	—	5%	Do. Red. Pref.	...	92—94	...
1,805,445	,,	,,	5	5%	Do. 5 p.c. Deb.	72½—74½	47—50	49
224,820	,,	Feb. 25	7½	7½%	South Shields Con. Stk.	157—159	85—87	...
1,087,795	,,	Aug. 11	6	5⅜%	S'th Suburb'n Ord. 5 p.c.	114—116	62—67	...
368,837	,,	June 30	5	5%	Do. 5 p.c. Deb. Stk.	116—118	72—77	...
647,740	,,	May 12	7½	3⅛%	Southampton Ord.	99—102	53—58	...
121,275	,,	June 30	4	4%	Do. 4 p.c. Deb. Stk.	...	36—38	...
120,000	,,	Aug. 11	—	6%	Tottenham { A 5 p.c.	135—138	60—65	...
782,275	,,	,,	6	4½%	Tottenham { B 3½ p.c.	115—117	52—57	...
181,855	,,	June 15	4	4%	District { 4 p.c. Deb.	87—89	52—55	...
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	...
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	45—50	...
236,476	Stk.	Feb. 25	5	3⅛%	Tynemouth 5 p.c. max.	108½—109	68—70	...
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	Aug. 11	8½	66/3	Wandsworth A 5 p.c.	151—156	77—82	...
255,636	,,	,,	6½	51/3	Do. B 3½ p.c.	129—134	54—59	...
108,075	,,	,,	—	46/4½	Do. C	...	54—59	...
140,865	,,	,,	—	46/4½	New Ordinary	...	54—59	...
352,000	,,	,,	6½	45/-	Wimbledon 5 p.c.	117—122	52—57	...
98,000	,,	,,	6½	50/-	Epsom 5 p.c.	121—126	54—59	...
88,416	—	June 30	5	5%	5 p.c. Deb. Stk.	65—69	40—45	...

* Ex Div.

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